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PRINCIPLES OF METHOD





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PRINCIPLES OF METHOD

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PRINCIPLES OF METHOD

PART I—THE NATURE OF EDUCATION

CHAPTER I

THE PURPOSE OF THIS MANUAL

THE HISTORY of the development of any art reveals a continuous progress from empirical practice to scientific procedure. From crude beginnings based on simple experiences, all our present-day arts have gradually risen in efficiency through the progressive discovery and application of the laws underlying their various operations.

For instance, the art of medicine had its origin in more or less random trials with herbs and other natural substances in the effort to find remedies for human ills. It is a far cry from the almost superstitious beliefs of primitive times in the beneficial properties of common substances to the scientific knowledge of medicine possessed by the physician of to-day. The observations and investigations of many experimenters throughout the centuries have gradually brought to light certain principles of anatomy, physiology, and chemistry, having a relation to bodily health. Through the discovery and the proper application of these principles, the art of the physician has attained a high standard of excellence.

Similarly, the art of surgery in earlier times, so far as it was practised at all, was by common consent assigned to the village barber or to some other person equally

skilled in the use of edged tools and equally ignorant of the principles of anatomy and physiology. To-day the art of the surgeon has reached an amazing degree of perfection through the apprehension of the laws underlying the structure and functions of the human body.

So also the art of agriculture began with crude attempts in cultivating the soil and planting seeds—attempts which frequently ended in failure because of the lack of scientific knowledge on the part of the experimenter. Agriculture has now risen to a high plane of efficiency through the discovery of the laws of biology, physics, and chemistry, and the application of these to the preparation of soils and the propagation and cultivation of plants.

One has only to contrast the simplicity of the buildings of a half-century ago with the complexity and stupendous proportions of the modern “sky-scraper” to be convinced that the arts of architecture and building construction have greatly advanced even in that brief period. It is quite evident that such an advance could be effected only through a clearer insight into the properties of building materials and a better grasp of the principles of mathematics and physics.

The art of teaching has had a similar life-history. It, too, shows in its development a progress from the empirical to the rational, from crude experiment to refined scientific procedure. It was not uncommon in pioneer days in Ontario to find teachers in our schools who had neither the aptitude nor the professional and academic training necessary for their work. They had no more right to attempt the work of instructing pupils than a barber has the right to attempt a surgical operation. But Ontario was blessed even in its pioneer days with a great host of “born teachers”, who not only gave us our

start, but also set our earliest standards. Unfortunately, however, these standards were often merely the outgrowth of devices that they had accidentally tried out and found successful. There was little or no evidence of thoughtful scientific planning in advance. Nevertheless, this element of direct experience in the school-room has been and must ever remain one of the basic conditions of progress. Direct experience has been reinforced, particularly in recent decades, by research work in psychology, child-study, sociology, and other kindred subjects. The application of the results of this research and investigation to the activities of the classroom has been the greatest single force at work in reducing the procedures of the classroom to a scientific foundation.

Recognizing, therefore, that at the basis of every art there are laws, upon the observance and application of which successful practice depends, we may proceed to investigate the principles which underlie the learning process, and to determine how these may most efficiently be applied in the teaching process. The apprehension of these laws will enable us to form a conception of a General Method of teaching, which it will be the purpose of this Manual to formulate. In the succeeding pages an attempt will be made to analyse the learning process, in order that we may deduce therefrom the principles of teaching, the application of which will facilitate the activities involved in learning.

CHAPTER II

EDUCATION AS GROWTH

ONE OF the first conditions of success in any enterprise is to have a clear idea of the nature of the task that is to be undertaken. Those who are engaged in, or are entering upon, the work of teaching, must, if they are to carry it out efficiently, have an adequate understanding of the meaning and purpose of education. Without this, their efforts in the teaching of children will be lacking in intelligence and barren of result.

NECESSITY AND POSSIBILITY OF EDUCATION

The first question that confronts us is—Why is it necessary that the child should be educated? One of the simplest and yet most significant answers is that he must be brought up to the level of attainment of the mature members of the community. One has only to contrast the helplessness of the infant with the ability of the adult to be convinced of this necessity. The young child's ignorance and lack of skill stand out strikingly against the grown man's organized knowledge and established habits. The contrast in ability suggests in the first place the need of transforming the inefficiency of the child into the efficiency of the adult. In other words, the necessity of education lies in the difference between the young and the old in character and in power of achievement. The young must be initiated into the skills, the knowledge, and the ideals of the mature; otherwise society will degenerate. As civilization advances, the gap between the capacities of the mature and of the young widens. It is the function of education, in the first instance, to span

this gap, in order that our civilization may not lose ground.

It is apparent, of course, that the mere bridging of the gap, the mere "catching up" with the mature will not suffice. That would result in a static society—a society that would merely "mark time" and make no advancement from generation to generation. The progress of society demands that each successive generation shall add something to the achievement of its predecessor. From this point of view, the purpose of education is not merely the development in the young of the same skill, knowledge, and ideals as are possessed by their elders, but also the cultivation of greater skill, broader knowledge, and worthier ideals.

Two conditions make the education of the child possible. The first is his *dependence*. At birth he is helpless in the face of the physical world, and for many years he is more or less dependent upon the ministrations of others for the satisfaction of his needs. In this respect at least he is much inferior to the lower animal, which easily adapts itself to its physical surroundings, and early in life becomes self-sufficient and independent. Because of the long period of helplessness and dependence in the case of the human child, he is the constant object of assistance and direction from others. The principle of contagion begins to operate early. He "catches" the sympathies and aversions of his elders. He develops similar interests, inclinations, and attitudes. As will be seen later, this is of great importance in his future learning.

The second condition which makes the education of the child possible is his *plasticity*. This is not merely the passive quality of impressionableness possessed by

certain inert substances, like clay, which yield to manipulation and retain the form into which they have been moulded. The quality of plasticity in the child implies rather the ability to learn from what happens to him, the power to retain from an experience something of value in meeting future situations. Without this characteristic, the child would be unable to modify his actions as a result of experience and would, in consequence, be incapable of education.

NATURE OF EDUCATION

Our next question is—What is the nature of education? One answer has been implied in the statement that it is necessary to transform the inefficiency of the child into the efficiency of the adult. It is evident that this transformation cannot be an instantaneous or even a rapid process. It must be a slow and gradual change. Just as the bud is slowly and gradually transformed, first into the blossom, and then into the perfect fruit, so the potentialities of the child in the process of time evolve into the capacities of the grown man. Education, in other words, is a process of growth. From the point of view of the teacher, it may be defined as the provision of conditions which best insure growth in the child.

It will at once be apparent that this growth is not merely physical—not merely the growth of the child into the bodily stature of the man. It is true that education is concerned to some extent with this phase of growth, and that nothing should be neglected to insure the normal development of a healthy body as the basis of future efficiency. But education is mainly concerned with growth in three specific directions, which, though distinguishable, are not separable. Education as growth means, (1) a constant addition to the individual's store

of serviceable habits—the cultivation of skill, (2) a continuous advance in knowledge and in the power to think—the cultivation of intellectual capacity, and (3) a progressive development of proper emotional attitudes and volitional tendencies—the establishment of worthy ideals and the will to achieve them.

This idea of the threefold aspect of growth is fundamental in an adequate conception of education. A detailed treatment of all three phases will be presented in later chapters of this book. At this stage it is necessary to refer to them only briefly and in general terms, in order that their essential significance may be understood.

First, education means growth in bodily control through the development of co-ordination of muscles and the formation of physical habits. Beginning with only a few inherited tendencies to movement, the child gradually acquires a multitude of physical habits, by means of which he gets control of the things in his surroundings. A familiar example is seen in the case of the child who learns to button his clothes. For the first three or four years of his life, he depends upon others to do this for him, but some day the tendency comes to do it for himself. After many failures, he succeeds in pushing a button through its proper hole, and, after many further repetitions, he develops a skill, at first imperfect, but eventually automatic. The illustration is typical of what occurs in the formation of countless other habits which give the child control over his muscles, and, through this, control over various phases of the environment.

Secondly, education means growth in knowledge. To the majority of people this is *all* that it means. They are right to the extent that knowledge constitutes an essential element in education. However, as has been

already indicated, it is only one of three equally important elements. At first the infant is entirely lacking in knowledge, but gradually, through his senses and his inherent ability to learn from experience, he acquires a fund of knowledge valuable in directing his conduct. This intellectual phase of growth is apparent from our illustration of the child who acquires the ability to button his clothes. He learns the purpose and importance of buttons; he watches his mother manipulate them, and perceives the way in which they are used to fasten things together; he forms an idea of the movements necessary to achieve this result; he clarifies this idea through successive efforts to perform the action. It is evident that, along with the skill acquired in using buttons, he has also built up a certain body of knowledge with regard thereto.

Thirdly, education means growth in feeling attitudes and conative tendencies. It has already been pointed out that during his long period of dependence the child acquires an interest in the doings of others and a desire to participate in these. When he is successful in performing an action, he experiences a feeling of satisfaction. He develops a certain emotional bent towards his environment, including the people and the activities about him. This is a most valuable acquisition, for, since he must live and work with other human beings later, his attitudes toward them and the work he has to do will determine to a large extent his future conduct. These emotional tendencies are exhibited by the child of our illustration who is learning to button his clothes. The desire to do what he sees others doing, to overcome a fascinating difficulty, or to relieve his mother of the necessity of assisting him, and the satisfaction he experiences when successful, constitute, in part at least,

the feeling element in his acquisition of the new art, and the determined, patient effort in the conquest of the difficulty constitutes the volitional element.

From the brief outline here presented, the threefold aspect of growth will be apparent. It is to be noted that the three types of growth do not exist as separable and distinct processes. They occur simultaneously. The acquisition of skill through habit, the gaining of knowledge through contact with the environment, and the development of emotional and volitional attitudes through activity and association with others, are concurrent and related processes, not isolated activities. This fundamental conception of education will be elaborated in subsequent chapters.

CONDITIONS OF GROWTH

We have now to inquire as to the conditions upon which this growth depends. Certain occurrences in the material world will afford a clue regarding what takes place in the human being. If a kernel of grain is planted in moist earth and placed where it can have warmth and sunlight, it presently sends forth little roots and leaves, and eventually produces a strong healthy plant. The moisture, heat, and light stimulate the inherent potentialities of the seed and arouse a characteristic response in the production of roots, leaves, and fruit. Evidently in the case of the seed two conditions of growth are present—stimuli from the environment and response to these stimuli.

The conditions of growth in the world of nature are equally the conditions of growth in the child. The child is placed from the first in the midst of a complex and ever-changing environment. This consists, in the first place, of the material things with which he is surrounded,

the objects of which he becomes aware through his senses. It includes the activities of the people, animals, and other things about him. It involves books, magazines, newspapers, pictures, works of art, which become sources of ideas and feelings to the child. It includes the emotional and volitional attitudes of those with whom he is associated. In short, the environment is everything, tangible or intangible, which stimulates the child through any avenue of approach to his mind. In the beginning, this means nothing to him, but gradually, through processes to be described later, it comes to have significance. We may conceive of this environment as presenting countless stimuli, which, as it were, knock loudly at the doors of his mind for admittance. In the early stages these stimuli are largely of a sensory variety, acting upon the nerves of sight, hearing, taste, smell, touch, temperature, etc. Upon the basis of the sensations coming through these avenues, the child makes an acquaintance with the properties of the physical world. Later, these stimuli from the environment come in the form of problems which challenge the child's ability to think and discover solutions.

But the child is not merely a passive recipient. On his side he exhibits active tendencies which, as it were, reach out for the stimuli presented by the environment. He responds by various activities. He has tendencies to movement, which impel him to strive for contact with the things about him. His senses exhibit a sort of hunger, which seeks satisfaction in seeing, hearing, touching, grasping, biting, striking, and throwing objects in his surroundings. He has a tendency to attend to things with arresting qualities, and to inquire into what is strange and puzzling. With the development of habits and acquired capacities, on the one hand the child gains

a greater control over the environment, and on the other hand the environment becomes richer in stimuli for the newly-established powers. Thus it comes about that the growth of the child in the three directions outlined—skill, knowledge, and attitudes—is dependent upon the interaction of his native and acquired tendencies with the environment. Or, more briefly, the conditions of growth are stimulus from the environment and response by the individual.

TYPES OF RESPONSE

The child's responses fall into three main types, the characteristics of which will be noted but briefly here, detailed discussion being deferred till a later stage.

The earliest forms of response are probably hereditary and unlearned. Regarding the identity and number of these, psychologists are by no means in agreement. As a matter of fact, for our present purpose it matters little whether certain tendencies are regarded as inherited or acquired. In any event, little harm will be done if we regard as hereditary the original tendency to move the limbs, to smile, to blink the eyes, to look at bright objects, to give attention to loud sounds, etc. The general tendency to physical movement is doubtless inherited and unlearned, however quickly it becomes tinged with the results of experience and developed into specialized movements that are unquestionably learned.

The second type of response is habitual. The tendencies to reach for, to grasp, to bite, to throw objects, or to make babbling sounds, to run, to climb, may have had an hereditary basis, but they soon become habits through repetition. The child's response to the presence of food before him at the dinner table by the proper use of his knife, fork, and spoon, is quite evidently a

series of habits learned by frequent repetition of appropriate acts. It will be noted that the habitual acts are performed without conscious attention and with a minimum of physical effort.

The third and highest form of response is the consciously planned action. For instance, let us suppose a child sees a desired object on a shelf—an immediate stimulus to activity. He knows he cannot reach it from the floor. He pushes a chair beneath the shelf, climbs upon it, and tries to reach the object, but fails. A similar procedure with a table, which he mounts by means of the chair, results successfully. The child's reaction to the stimulus in this case was quite evidently a plan of considerable complexity.

A more extended analysis of the three types of response—the hereditary, the habitual, and the conscious—will be made in Chapters VIII and IX.

CHAPTER III

AIMS IN EDUCATION

IN THE preceding chapter, education has been identified with growth, and growth has been shown to coincide with the interaction of inherited and acquired tendencies with the environment. When one considers the great variety and complexity of human tendencies on the one hand and the richness of the environment in stimuli on the other, one cannot but be impressed with the vast possibilities for interaction between the two. The potentialities for growth in the three fields of human capacity—habit, knowledge, and attitude—are, therefore, unlimited. It is obvious that growth, whether for good or ill, is bound to proceed in any event, and therefore it is important that the educator should decide the direction and form that this growth should take. Standards must be set whereby the desirability of certain directions or types of growth may be determined. This necessity of setting standards has given us the aims in education.

These have been variously set forth by educators in the past. A statement of the aim at a given period has usually resulted from a perception of the needs and defects of the time. Each aim thus formulated may be regarded as a point of view from which existing conditions may be surveyed and means of overcoming deficiencies may be devised. Each period tends to emphasize what it lacks. But while many apparently different aims have been proposed, most of them are quite consistent with one another, and few of them are wholly contradictory. Seeming variations are the result of differently placed emphasis.

Most of the varying views may be classified under two heads, (1) the social view, which lays the stress upon the demands of society, and (2) the individualistic view, which lays the stress upon the needs of the individual. The former regards the welfare of the state or of society, the latter the welfare of the individual, as the all-important consideration in the education of the young.

THE SOCIAL VIEW

Educators who hold the social view of the aim of education have differed as to the number of individuals who need to be educated. Some have maintained that the aim should be merely to preserve and pass on for the benefit of future generations the intellectual and moral achievements of the present and the past. This demands, according to their view, the training of only a small body of scholars, who will be sufficient to conserve wisdom for the guidance of the whole community. All the members of society need not be educated, but only the prospective leaders. This is the *aristocratic* view of the aim of education—a view which prevailed for centuries in most civilized countries. The most famous statement of the aristocratic view is to be found in Plato's scheme of education as outlined in his *Republic*.

Against this view, it is claimed by other educators that, while the welfare of society is the chief consideration, this can be assured only by a proper training of each of its members. On the principle that a chain is only as strong as its weakest link, they maintain that education should be universal, in order that every individual may be fitted to be a useful member of society. This is the *democratic* view of education, which insists upon education for all for the sake of society. One of the earliest advocates of this view in Ontario was

Dr. Egerton Ryerson. In an early editorial in *The Christian Guardian*, he made the following declaration of faith in the democratic ideal:

On the importance of education generally, we may remark it is as necessary as the light—it should be as common as water, and as free as air. Education among the people is the best security of good government and constitutional liberty; it yields a steady, unbending support to the former, and effectually protects the latter. An educated people are always a loyal people to good government, and the first object of a wise government should be the education of the people.

THE INDIVIDUALISTIC VIEW

Educators who hold the individualistic view believe that education is primarily for the benefit of the child and not for the benefit of society. They insist that, since each child is created with a separate and distinct personality, he therefore has a right to have his potential capacities developed to the highest possible extent independently of the claims of the community. What constitutes this highest development of the individual is again a matter of apparent disagreement. Some of these varying views will be considered briefly at a later stage in this chapter.

THE TRUE AIM OF EDUCATION

Though apparently contradictory, both the social and the individualistic views of the aim of education are essentially true. Each emphasizes but one side of the complete aim. This may be seen from the following considerations.

The child is, by the very force of environmental circumstances, a social being. He is born a member of an organized society. He is first of all a part of a social unit, the family; and as he grows older he finds himself a

member of various other social units. He could not, if he would, avoid participation in group activities of various types. Moreover, he is by his very nature a social being. Very early, by reason of his dependence on the ministrations of others, he exhibits an interest in the activities of those about him and a desire to participate in these activities. This tendency is accentuated as he grows older and as the circle of his human associations widens. He becomes a satisfactory member of society when he enters freely, fully, and efficiently into the common activities of the social groups to which he belongs. In this participation in social action, his powers are best exercised and developed. It follows that his own individual good can never be really opposed to the good of society, and that, in developing those tendencies which further the general welfare, he is thereby furthering his own welfare. In other words, in promoting the good of others, the individual achieves his own highest good; in striving to make the world a better and happier place in which to live, he attains his own happiness.

Thus the true aim in education represents the elements of truth in both the social and the individualistic views. In the first place, the true aim is a social aim, because the value of the child's tendencies can be judged only by their influence upon the good of society. Secondly, the true aim is equally an individualistic aim, because the development of the child's social tendencies is found to be best for himself as well as for society.

In this view of the aim of education, it is apparent that society may secure advancement through the proper education of its members. This aim not only contemplates the utmost development of the best tendencies of the individual, but it also implies some contribution by the individual to the elevation of society itself. Social

life is, therefore, not a static thing to which the child must be adapted, but rather a dynamic thing having the power to advance itself through the development of the higher tendencies of its members.

The ideal of education and of life thus proposed has been given various names. By some it has been called social efficiency, by others good citizenship, or complete living. But however it may be designated, it means in the last analysis the promotion of the highest good of others, and thereby the highest good of the individual himself. It may be noted that this ideal has been sanctioned by the great founder of the Christian faith, and the Christian church, following the practice of its divine exemplar, has all down the centuries emphasized the promotion of the welfare of others as the great source of individual happiness.

If this ideal is accepted as the final purpose of education, it follows that the activities of the school should have their ultimate end in fitting the pupils for worthy and useful service in the world. In the discussion of the learning and the teaching processes in the subsequent pages of this book, the reader will, therefore, not forget that the most valuable phase of training is the development of the power and the will to contribute in a maximum degree towards the welfare of society. And, in the various activities of the classroom, it is important to remember that the things learned have an end beyond themselves, and that their ultimate worth should be judged by their effect upon the character and ideals of the pupils.

To be an efficient member of the social organization presupposes the fact that each individual has some work to do, some occupation or vocation in life. The performance of this work or the pursuit of this vocation in such

a way as to promote the good of society requires the possession of at least three elements. These will be recognized by the reader as identical with the three phases of growth discussed in the preceding chapter.

1. Knowledge

Every person should know the facts and principles involved in the work he has to do. The child must know the ways in which he may be useful in the home and in the school, and the ways in which the environment may be turned to account for this purpose. The physician must know the structure and functions of the organs of the human body, the symptoms of disease, and the remedies to be applied for the cure of ills. The teacher must know the laws underlying mental activity, proper methods of organizing, managing, and teaching a school, and the facts of the course of study. The carpenter must know the qualities of various kinds of woods, the proper methods of combining these in building, and the correct use of his tools. It is apparent that the possession of a wide knowledge of the things amid which one works is an essential element in the performance of that work in such a way as to make it of the best service to others.

2. Skill

Knowledge alone will be inadequate; the individual must also have skill in the practical application of his knowledge. In other words, he must have developed a set of desirable habits giving him a facility of action in the particular field in which he works. The child must have useful habits in respect to the objects of the environment. The physician must have skill in the diagnosis of disease, in the prescription of remedies, and in the occasional use of surgical instruments. The teacher

must have skill in teaching and managing children and in organizing the work of the school. The carpenter must have accurate habits in the manipulation of his tools and in putting timbers together in a proper way. Without this skill in the effective application of his knowledge, the individual would be of little value to society.

3. Right Attitudes

But the possession of both knowledge and skill will not make the individual a highly useful member of the community unless he possesses still another essential quality. The individual who uses his knowledge and skill only to secure praise, to make money, or win renown for himself, without regard for the good of others, cannot be regarded as socially efficient. The child must have a desire to be of assistance to his parents; the physician a desire to relieve his patients of needless pain; the teacher a desire to promote the good of his students; the carpenter a desire to build houses that are convenient and comfortable for those who occupy them. That is, there must be an attitude of sympathy, a tendency to be helpful towards others, and a persistent effort to do his work well, if the individual is to contribute a maximum degree to the welfare of society.

OTHER STATEMENTS OF THE AIM

It still remains to examine briefly a few of the most commonly held conceptions of the past regarding the purpose of education. It will be noted that all of these views lay the emphasis upon the individualistic aspect of education. But, as noted above, it will be found that these aims, if rightly interpreted, mean precisely the same as the ideal described above, or if not they emphasize some phase of this ideal.

1. The Vocational Ideal

This is commonly called the utilitarian aim, because it emphasizes that phase of education that is directly useful in preparation for earning a livelihood. It should be noted that the training given to the pupil in the elementary and academic secondary schools of Ontario does not aim to fit him for earning a livelihood in the sense of giving direct preparation for particular vocations. However, it provides the foundation, by giving him control of the common essentials of knowledge or experience which will be useful in acquiring knowledge and skill in any occupation that may later be chosen.

The utilitarian aim has been attacked as over-emphasizing the practical and materialistic phases of life. It should be pointed out, however, that, when an individual earns his living, he is pulling his own weight in the social boat and relieving society of the necessity of providing a living for him. From that standpoint, the earning of his living is an essential element of social efficiency, provided thereby he is promoting the social good. If, on the contrary, he makes a living at the sacrifice of the rights and comfort of others, and thereby hinders the social good, he is a burden or a menace to society. The emphasis that is laid in Ontario schools upon the adaptation of school materials and activities to the needs of practical life, particularly in the field of technical and vocational education, is evidence that the utilitarian ideal to that extent has official sanction.

The practical arts have their own wealth of knowledge and their own culture values. The preparation for a particular trade is never confined to its purely mechanical features; it is never solely a training in manual skill. Each trade has a body of knowledge connected with its

various operations quite apart from information regarding the best ways of performing them. The skilled plumber, for instance, must see the operations of his trade in their mathematical, scientific, historical, and social relationships. That is, he should know the mathematical and scientific laws underlying these operations if he is to practise them successfully; he should know the history of the development of his craft from its beginning; he should have a conception of the part played by his work in promoting the welfare of the social organism. Each trade, has, moreover, definite relationships with every other trade, a knowledge of which should form part of the equipment of every member of the craft. The carpenter, for example, must have regard to the work of the members of associated trades—the bricklayer, the plumber, and the electrical worker—and the more he knows of the operation of these trades, the more clearly will he realize his relationships with them, and the more intelligent and skilful his work will be on that account.

In receiving an adequate training for his vocation, it will be apparent that the tradesman must acquire a wide fund of knowledge relative to his craft and those other crafts associated therewith. In addition to this, his training should give him whatever other knowledge a citizen should acquire. This extensive knowledge of various fields involves a grasp of wider and wider relationships, and, as will be seen from the following section, this constitutes true culture. Along with this knowledge and culture should go inevitably, in a proper scheme of training, right attitudes—a desire for service and an unvarying tendency in all his work to promote the good of the community he serves.

Everything that has been said about the craftsman is equally applicable to the individual engaged in any other vocation—in the professions, in commercial and industrial pursuits, in the civil service, and in the world of labour in general. Thus it will be seen that the vocational aim of education is, in its essence, identical with the true ideal of education we have already set forth.

2. The Culture Ideal

In the opinion of many educators, education is justified on the ground that it furnishes the individual with a degree of personal culture. A narrow view of culture regards it as the acquisition of a certain conventional knowledge, especially in the fields of language and art, which gives the possessor a polish, grace, and refinement of manner, speech, and ideals, and thus distinguishes him from the crude and ignorant. Such a narrow educational ideal cannot be defended. Culture in its true sense is much broader in its scope. An individual's culture is measured by his ability to perceive meanings, to grasp relationships in any field of human experience. It is not purely an inner quality of personality, but it requires the accomplishment of outward results of value to others. The ideal of culture is, therefore, not opposed to the true ideal already described. Social efficiency, as the capacity to enter fully and freely into common activities, is, in fact, impossible without culture. In other words, the individual cannot participate fully in the activities of social life without this capacity to perceive meanings. Moreover, social efficiency results in culture, because the individual, in engaging in intercourse with others, expands his mental horizon and grasps relationships which would otherwise remain hidden. Thus again we note that a so-called individualistic ideal has its social value.

3. The Ideal of Moral Character

The aim of education that from the earliest times has been most frequently and persistently advocated is the development of moral character. Morality is generally defined as the subordination of one's lower selfish tendencies to one's higher ideals. The question at once arises as to how one's lower tendencies and higher ideals are to be distinguished. Obviously it is their relation to the welfare of others that affords a standard of judgment. One must subjugate his lower tendencies for the sake of others, and one must allow his higher tendencies freedom of action for the sake of others. One's selfish tendencies are undesirable, because when exercised they interfere with the social welfare, and one's higher ideals are desirable, because when given expression they promote the social welfare. Morality presupposes a social organization as a field for its operation. One can be moral only in association with others. Moral action is that which promotes the good of society; immoral action is that which hinders the good of society. Morality thus appears to be synonymous with the ideal that has been proposed as the ultimate end of education.

In this analysis of the moral ideal as the aim of education, the reader will not fail to observe that the aim implies more than the possession by the individual of a certain moral sentiment. A man is truly moral only when his moral character is functioning in right action. This means that the moral man must be individually efficient in action, and must likewise control his action with a regard for the rights of others. There is always a danger, however, of assuming that the development of moral character consists in giving the child some passive quality without any necessity of having it continually functioning in conduct. It must always be borne in mind

that morality is not merely a benevolent sentiment, but rather a consistently desirable mode of behaviour.

4. *The Harmonious Development Ideal*

A theory of education that was given a great deal of prominence during the nineteenth century is known as the psychological ideal. It asserts that the aim of education is the harmonious development of all the powers of mind and body. Its advocates point out that the human being possesses certain divinely-given powers, and that education should provide opportunity for their harmonious development.

The ideal has its main value as a protest against two traditional tendencies in education. In the first place, it points out that the purpose of education is not merely the acquisition of knowledge, which has too often been regarded as the sole aim, but rather the development of the capacities of the individual. In the second place, it protests against a one-sided development. The scientist, for example, may become so immersed in the world of phenomena that he may lose all interest in things artistic; while on the other hand the artist may become so engrossed with things of beauty as to lose all connection with the affairs of practical life. Against such extremes, the ideal of harmonious development constitutes a needed warning.

However, there are several difficulties in the way of the unreserved acceptance of the ideal. One lies in the meaning assigned to the word *harmonious*. Some writers have interpreted it to mean *complete*, and are at once faced with a wholly impracticable ideal, for it is obviously impossible in the space of one human life to carry all human capacities to their complete fruition. Other writers have interpreted the term to mean *equal*,

and thus propose an ideal which has produced in the world of practical affairs the jack-of-all-trades who is master of none. Probably a more nearly correct interpretation of the term is *balanced* or *symmetrical*. Powers are in harmony when they contribute to unity of work, or when they do not interfere with each other. But even this interpretation would lead to the same practical difficulties as the interpretation *equal*, noted above.

A second difficulty lies in the meaning assigned to *powers*. The earlier writers assumed that the mind has a number of *general* powers, such as perception, memory, imagination, judgment, and reasoning, and that each of these may be improved by exercise in any given field. Thus it was said that an individual had a good power of perception when he observed accurately the articles in a store window or the clothes worn by a person he met. It was also said that he had a good memory if he recalled accurately lists of names in geography or lists of dates in history. The theory that the mind has *general* powers is usually designated "faculty" psychology, and the belief that each of these general powers may be improved by training in specific fields is known as the doctrine of *formal discipline*.

The experience of practical life disproves these theories. For example, it is a common occurrence that an individual may observe colours well, but observe forms poorly; that he may remember the formulas of mathematics well, but remember the forms of the French irregular verbs badly; that he may have good judgment with regard to the qualities of a suit of clothes, but poor judgment regarding the characteristics of a house; and so on. That is, there appear to be, not a few *general faculties*, but rather many specific *capacities* of observing, remembering, judging, reasoning, etc.; as

many capacities, in fact, as there are things to be observed, imagined, judged, or reasoned about.

“Faculty” psychology and the doctrine of formal discipline have, therefore, been very largely abandoned. Psychologists now generally agree that certain special capacities in definite directions may be strengthened by training, without observable effect upon a general power. For instance, the ability to observe plants, or to remember telephone numbers, or to judge the qualities of pictures, or to reason in grammar, may be improved by practice, without, however, improving the ability to perceive, remember, judge, or reason in other fields. What then may correctly be said regarding this question of mental training? The truth appears to be that the individual may “carry over” to other fields the methods that he used in the cultivation of specific capacities in particular fields. For example, he may apply in the memorizing of Latin declensions and conjugations the same principles as he used in the memorization of poetry, and thus increase his ability to remember forms in Latin. And he may adopt in the field of geometry the same methods as he used in reasoning in arithmetic, and thus develop an ability to reason in geometry. What is carried over from one field to another is not a general ability which facilitates learning in the new field, but rather an *ideal* of what successful observing, remembering, judging, or reasoning involves. This ideal may function in the cultivation of a new ability to observe, remember, judge, or reason in the new field. In other words, what is carried over is not a ready-made general ability, but an ideal of successful procedure which may result in the development of a specific capacity in that field. The student will, therefore, be on his guard against the acceptance of sweeping

generalizations, such as that learning poetry improves the memory, or that studying geometry develops the faculty of reasoning.

A further objection to the ideal of harmonious development arises in the field of morality, in the fact that not all human capacities are good or beneficial, especially when wrongly directed. The tendencies to become angry, to fight, to lie, and to steal, which are often observed in young children, must be eliminated rather than encouraged. The harmonious development of moral characteristics should, therefore, be limited to desirable tendencies and capacities, before it can be acceptable as an aim in education.

This last statement suggests a clue as to the relationship existing between the harmonious development ideal in the moral field, and the social ideal. How are good and bad tendencies to be distinguished? The tendencies to anger, fighting, stealing, lying, etc., are evidently undesirable, and therefore should be eliminated because they run counter to the social good. On the other hand, the tendencies to industry, truthfulness, self-sacrifice, etc., are desirable, and therefore should be developed because they promote the social good. In other words, the final test of a good or bad tendency is its relation to the welfare of society. The ideal of harmonious development, limited to desirable tendencies and powers, is evidently closely parallel with the complete ideal already discussed.

HUXLEY'S DEFINITION OF EDUCATION

It will be an interesting problem to compare the various aims of education as set forth in this chapter with the famous definition given by the English scientist,

Thomas Henry Huxley, in his essay on *A Liberal Education*. The reader will find that Huxley has crystallized in his statement all the characteristics that we have demanded in the socially efficient individual.

That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order; ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature, and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself.

CHAPTER IV

EDUCATIONAL AGENCIES

INFORMAL AND FORMAL EDUCATION

IN A previous chapter the fundamental principle was established that the child's education—his growth in the fields of habit, knowledge, and attitudes—is the result of interaction between his inherited and acquired tendencies and his environment. The types of the child's responses were briefly discussed, and the general character of the environment briefly stated. In this chapter, the question of the nature of the child's environment, particularly the avenues by which he comes into contact with it, will be more carefully considered.

In the first place, let us note that the environment may be either accidental or regulated. In the child's free contact with the things about him and in his free association with people, he has an accidental or uncontrolled environment. No attempt is made in this environment to give him any special kind of experience which will result in the acquisition of any particular type of skill, knowledge, or attitude. He *grows* in these directions, of course, but his growth is uncontrolled by any specific agency. The type of education thus obtained is usually designated as *informal*. As the name implies, informal education is that which comes incidentally and without conscious direction through contact with others and with the physical environment.

On the other hand, the child's environment may be regulated or controlled by some outside agency for the specific purpose of giving him a particular type of experience. Reverting to our illustration of the child and

the buttons, used in a previous chapter, we may imagine the child's mother some day making it a condition of his being dressed that he button his clothes himself. She shows him how to put the button through the hole and lets him try it himself. The mother thus arranges the environment for the definite purpose of securing a reaction that will contribute something to the child's growth in knowledge and skill. She does the same thing when she places a bowl of porridge before him and demonstrates the use of a spoon, or when she shows him how to tie his shoe-string and leaves him to master the art. This is *formal* education. It comes through conscious regulation of the environment for a definite purpose, by individuals or by institutions such as the school.

TRANSITION OF INFORMAL TO FORMAL EDUCATION

In the early history of the race, the family was the first social unit to emerge. The training of the young was, to a great extent, a matter of informal education; the children learned through chance contact with the environment. The activities involved in getting food, clothing, and shelter were learned by imitation. The early games and amusements of the young were miniature reproductions of the serious activities of their elders. For instance, the boys played with a log in the water and learned to balance and paddle as they would later have to do in a canoe; while the girls made utensils of clay and played at the preparation of food. But, even in primitive times, there was some trace of formal education, for the youths accompanied their fathers in the chase and learned the use of weapons; while the young women assisted their mothers in the making of clothing, and thus acquired skill in the use of the necessary implements. While the processes were largely

imitative, there was also more or less definite instruction on the part of the elders.

As civilization progressed, the tribal form of organization made its appearance. It became customary to transmit to the young the religious beliefs of the tribe at initiation ceremonies. This task was gradually assumed by particular members, who became a sort of priesthood and the first specially designated teaching class. With the passing of time and the further advance of civilization, a large body of useful practical knowledge, aside from religious beliefs, was accumulated by the tribe. A written language was invented to facilitate its preservation. It then became desirable to provide for the communication of this valuable knowledge to the young during their earlier years. Thus arose the conception of the school as an educational institution, and of a teaching class separate from the priesthood.

FUNCTION OF THE SCHOOL

The school has become the greatest of all agencies in the education of childhood and youth. It exercises its influence in three important ways: through the character and personality of the teacher, through the association of the children among themselves in competitive and co-operative activities, and through the school curriculum. The two former may be regarded as phases of informal education. The latter, which is the most characteristic feature of the school, constitutes the medium of formal education. In other words, the school is the principal medium for the provision of a regulated environment in the form of a course of study. It is the teacher's function to use this environment as a source of suitable stimuli for the child's inherited and acquired capacities, and through the control of these stimuli to

direct the child's response in suitable ways. As this book deals largely with the training of the child through the teaching processes of the school, it will be unnecessary to treat the functions of the school in greater detail at this point.

OTHER EDUCATIONAL AGENCIES

1. *The Home*

All down the ages, the home has maintained its place as an educational institution of great fundamental importance. It brings its influence to bear upon the child during the period of his greatest helplessness, dependence, and plasticity. In the home the child develops his earliest adjustments to his surroundings, his earliest habits of speech, and his earliest moral and religious ideals. Here he learns the conventions of social life and the elements of worthy behaviour. Here still, as in ancient times, the young girl acquires a certain ability in household tasks, and the young boy in the cultivation of the soil, the care of animals, and various other duties. Most of the education of the home is of an informal character, acquired incidentally through participation in the daily activities of the family. While it is probable that many parents consciously direct the education of their children to some extent, there appears to be an increasing tendency on the part of the home to throw upon the school the responsibility for nearly all the formal education of the young. As an institution for formal education the home has two disadvantages—lack of leisure on the part of parents, and lack of knowledge of methods of instruction. To offset these disadvantages, there are evidences of a growing tendency to greater sympathy and more effective co-operation between the home and the school in the education of the child.

2. The Church

Of all the formal agencies of education, the church was the first to emerge. In primitive societies, the necessity for formal education began when the young were initiated into the religious rites and mysteries of the tribe. As this religious knowledge must be handed down to succeeding generations, a teaching class, or priesthood, had to be instituted. Thus the church emerged, and continued for centuries as the sole agency of formal education. The church, therefore, was the forerunner of the school, and the priests of the church constituted the first teaching order. The church in modern times has lost most of its teaching functions in the secular field, though in some communities it still maintains some measure of control. It still retains its function as the chief institution for the communication of religious experience.

3. The State

Among all progressive peoples to-day, the state has assumed control of the education of its youth. It has done so, in the first place, for the sake of its own protection, advancement, and welfare. That state survives which has highly developed intelligence among its citizens. For mere survival, as well as for its own advancement materially and spiritually, the state must organize a system of education which shall include all its members. In the second place, the progressive modern state must control education because it is a democracy. All the members of a democracy are responsible for its government. Much wisdom is demanded of rulers and governors. Therefore, since people are their own governors, they must be educated for the important office. A democracy of ill-educated citizens is a contradiction in terms; it is a vulgar rabble swayed by chance emotions,

rather than a band of well-trained citizens governing themselves wisely and appropriately.

For these reasons, in all enlightened countries to-day there is some sort of state control of education. In all the provinces of Canada, for instance, the departments of education subsidize the schools, formulate regulations for their government and maintenance, prescribe the courses of study, authorize the text-books, and provide for the training and certification of teachers.

4. The Vocation

In earlier days, the apprenticeship system prevalent among the trades afforded the youth a formal training for his future vocation. The master of the apprentice educated him, in the best sense of the word, for he contracted not only to teach him the mysteries of the craft, but also to train him in right behaviour. With the rise of the factory and the development of mass production, the apprenticeship system has gradually fallen into disuse. In its place has been substituted a training in technical schools in both full-time and part-time classes. Such training, though designed to fit the student for employment in commerce or industry, is a phase of school education, and is largely prevocational. One feature of our present educational system—night-classes for mechanics in our technical schools—is an attempt to combine practical employment with formal instruction.

The vocation itself, however, is an educative agency of the highest importance. The daily employment by which an individual earns his living affords experiences which are effective in influencing his adjustment to future situations. Probably the most educative experience that any individual ever has is the experience of earning a living. Happily we have discarded the belief that education ends with school training. We now realize that

education is coincident with life itself, and that one's training, whether for good or ill, goes on continuously so long as one works. For instance, the teacher, especially if he studies his art and is critical of his own efforts, will receive a training through the daily work of the classroom that will increase his efficiency as his experience grows. And what is true in relation to teaching is equally true of other occupations.

5. Subsidiary Agencies

A host of other agencies play a large part in education. The press and the public library discharge great and important functions in the advancement of knowledge and the moulding of opinion. Various organizations, such as literary and debating societies, women's institutes, service clubs, etc., afford valuable experience to their members that cannot fail to affect their future action. Such agencies may reasonably claim recognition as valuable educational factors in the community.

CHAPTER V

THE NATURE OF EXPERIENCE

THE TERM *experience* has already been frequently used in the foregoing pages, and will be used even more frequently in later sections of the book. It is important that its significance should be clearly understood. The popular meaning of the word is essentially the same as the pedagogical. We may, therefore, understand what the term involves by reference to the practical affairs of life. The following typical examples of experience are given to assist in the analysis of its meaning.

A little girl had her hand severely burned, and rushed to the family medicine chest for carron-oil which she had used before under similar circumstances. The carron-oil bottle was empty. In desperation she looked over the other bottles, and at random seized one containing milk of magnesia. Applying this preparation to the burn, she was surprised that she had by accident hit upon a relieving remedy. Later, she learned that both preparations mentioned contain a large proportion of lime-water, which is efficacious in burns.

A boy making a table wished to have a highly polished top. He rubbed it very carefully in all directions with sand-paper and finished it with varnish. He was disappointed to find that the surface showed scratches where the sand-paper, in crossing the grain of the wood, had cut the small fibres. Realizing that he should have rubbed the wood in the same direction as the grain, he removed the varnish and sand-papered the top over again.

A consideration of these examples will show that experience has two sides—an active, striving side, and a passive, enduring side. The little girl tried to cure a burn by the application of an unusual remedy, and enjoyed an agreeable result in relief from pain. The boy tried to get a smooth top on his table by the wrong use of sand-paper, and suffered a disappointment as a result of finding a scratched surface. There was a reciprocal connection between what they did to things and what they enjoyed or suffered in consequence. But the most important feature of their experience was that it left behind an effect which would enable them to anticipate the results of particular modes of action. The little girl learned something that would enable her to meet a future emergency, and the boy learned something useful in his future attempts at wood-working. Both learned to read the future by what happened in the past.

It is apparent then that experience gives us an ability to adjust ourselves to what is coming. Each new experience of a useful kind helps us to meet future situations in a more effective way. As our contacts with the environment increase, our experiences multiply. These accumulated experiences, preserved by memory, constitute an ever-growing fund which may constantly be reconstructed in new forms to meet new situations, to solve new problems, and thereby to give further experience and further knowledge.

It is to be noted that this adjustment to new situations which experience brings is not merely a matter of biological adaptation or accommodation. The animal adapts itself to an environment which it has little power to change, and upon its successful “fitting in” depends its ability to exist. Man has the same power of biological adaptation as the animal, but in addition he has the

power to change the environment to suit his purposes. He does not sit passively by and accept nature as it is. Thrust into an unfruitful desert, he studies the possibilities of plant growth and introduces irrigation. Thwarted by mountain barriers and unfordable rivers in his desire for rapid lines of communication, he tunnels the one and bridges the other. Scourged with smallpox, he discovers a vaccine which makes him immune to the disease. Adjustment involves, therefore, not only the adaptation of our activities to the environment, but also the adaptation of the environment to our activities.

The chief element in experience is thinking. Thinking is the effort to grasp the relation between what we do and the consequences of our action. The little girl in the illustration used above set up a relation between a new remedy and relief from the pain of a burn. The boy set up a relation between the use of sand-paper in a particular way and the production of a smooth surface in wood. We think, or in other words have an experience, when we are confronted with a situation which is uncertain or problematic, and when, in the face of this situation, we set up relationships among the elements at our disposal, in order to make tentative plans for meeting it. We should note, however, that thinking always involves risk; our conclusions are always doubtful until verified by actual trial.

The human being is fundamentally a doer, and his knowledge is meant to be used in directing action. This, in fact, is what gives meaning and purpose to his thinking. However, it should be noted that not all of his experiences issue immediately in action. It is true that, in the case of the boy and the table, the solution of the difficulty was at once given practical application in the

refinishing of the table. It is equally true that numberless experiences in his daily life have an immediate issue in action. But it will be apparent that this is impractical and impossible in all cases. For instance, there is no immediate need for a child to learn how to stop a nose-bleed, or for a teacher-in-training to learn how to present division of decimals, yet each is prepared to make this a problem, because he feels that such knowledge may enter into the solution of future difficulties. Thus the value of new knowledge is often remote and intellectual. Besides the value in removing present physical difficulties, experiences have a secondary value, in that they may enter into the construction of new experiences at a future time.

This suggests that experience is of two kinds. For instance, the teacher-in-training obtains one kind of experience in the classroom of the practice school in the actual teaching of children. He receives another kind of experience in the classrooms of the training-school, where he discusses methods of teaching and managing children. Similarly, the student in the commercial department of the high school gets one kind of experience in the training he receives in bookkeeping and accountancy. He gets another kind of experience when he is employed in a business office, where he actually does the things about which he has been taught in the commercial school. So too, the kind of experience that the golfer has when he is instructed by a professional in the proper way to stand and to hold and swing his clubs, is different from the experience he has when he gets out on the golf course and plays a real game. One kind of experience comes from vital, first-hand contact with the situation. The other kind comes through the intervention of media in the form of instructors, books, news-

papers, pictures, etc., through the appropriation of the experience of others. The first variety is *direct* experience, and the second is *indirect* experience.

Both direct and indirect experience modify the individual's future adjustment to situations, but the former has the greater influence. The little child who touches the hot stove has a more vivid and impressive experience than the child whose mother tells him that the hot stove will hurt him. Similarly, the teacher-in-training obtains a more vivid and impressive experience in the classroom of the practice school, actually teaching children, than he obtains in the lecture room, in the study of methods of teaching. So too, the young man in the bank or business office will have experiences more effective in modifying his future conduct than the young man in the commercial school.

But while direct experience is more impressive and vivid than indirect experience, the latter is often more economical. The little child may be saved a painful burn by a timely warning from the mother. The teacher-in-training will be spared many costly experiments by the discussion of methods in the training school before being placed in charge of a class of children. The young man in the commercial school will likewise be put on his guard against expensive mistakes that he would probably make if thrust into a bank or business office without previous training.

Moreover, direct experience comes frequently in a haphazard way, without explicit direction and often without purpose. On the other hand, indirect experience may be given in a regular and systematic way, and thus may have a maximum effect in modifying future adjustment. The great advantage of the experiences given to

the student in the training school or commercial department is that they are directed in a systematic and purposeful way, while those of the classroom or office come to the teacher or business man more or less unsystematically, and often without any purpose so far as the modification of future adjustment is concerned.

Both direct and indirect experience are necessary to the individual. One is the complement of the other. Indirect experience has meaning for the individual only through the use of similar experiences of his own in the past. If the individual learned by direct experience exclusively, he would make but slow progress, and would in fact be reduced to the level of the brute creation. Under this condition, each generation of humanity would begin where the previous one began, and run the same round. The animal world is capable of learning only by direct experience. That is one reason why there has been no progress in the animal world. The horse, for instance, has the same mental equipment to-day as its ancestor many thousand years ago. The human being, on the other hand, has progressed mentally, because he has the power of learning by indirect experience. He is capable of appropriating the experiences of past generations, and turning these to his own use in the fulfilment of his purposes. He is able to capitalize, as it were, the knowledge and skill the race has achieved through countless years, and to make selections therefrom to aid him in attaining his ends. It must be remembered, however, that the appropriation of race experience demands as a prerequisite the possession of a background of direct experience through which it is given significance.

There is a certain correspondence between direct experience and informal education on the one hand, and between indirect experience and formal education on

the other, though the correspondence is by no means absolute. Informal education, as explained in Chapter IV, comes incidentally, without conscious direction of the child's experiences by others. Formal education comes through conscious direction of the child's experiences for a definite purpose, by individuals or institutions. It will be apparent that the informal education of the child will consist largely in letting him secure a large fund of direct experience. On the other hand, the formal education given by an institution like the school will involve a large body of indirect experience. However, it would be a poor school indeed that did not give the pupil, in addition to this indirect experience, a great deal of direct experience. As will be seen later, much of the work of schools of all types consists in objective teaching and participation in activities—matters of direct experience and equally of formal education.

CHAPTER VI

THE SCHOOL CURRICULUM

IT WAS pointed out in the preceding chapter that the human being is capable of learning from the experience of others. He is able to appropriate the experience of past generations of humanity, and to turn it to account in adjusting himself to situations which he must meet in actual life. This, it will be recalled, is the ability to learn by indirect experience, a characteristic which distinguishes the human race from the brute creation.

In its long and toilsome journey from its original barbarism to its present stage of civilization, the race has accumulated a vast store of experience valuable for the guidance of conduct. Through oral and written language, through institutions, through inventions and engineering projects, it has transmitted this rich accumulation from one generation to another throughout the centuries. It is a familiar saying that the child of to-day is the heir of all the ages. This means, of course, that he has at his disposal, for the direction of his behaviour, the accumulated experience handed down by his ancestors since the dawn of civilization.

How is this useful experience of the past to be transmitted to the child? To a large extent through the school curriculum. In Latin the word *curriculum* means a race-course, or a course to be run. In our day the term retains much of its original meaning. The curriculum of the school is still in a sense a course to be run—a course of studies and activities to be pursued in the school. Its materials consist of the essentials of the

current knowledge of the day that it is desirable to transmit, organized in a form intelligible to the child. The ultimate source of these materials is the collective experience of the past. From out of this practically limitless storehouse of social inheritance, educators have selected specific arts and sciences for transmission to the young, and have formulated these in a curriculum. The curriculum, therefore, embodies those experiences which the race in the course of centuries has found useful in meeting its needs. It includes the most useful elements of knowledge and skill that humanity in its onward march in civilization has learned.

As an example of this useful knowledge and skill transmitted from the remote past, we may consider the arts of communication. At an early stage in the history of the race, human beings found it necessary to adopt and to master a spoken language, as a means of impressing upon one another their wants and ideas. The development of oral speech was one of the most important steps in human progress, for not only did it make social life possible, but it also enabled each generation to pass on to its successor the benefits of its discoveries. But spoken words are fleeting, and human memory is unreliable. Oral language was inadequate to the accurate transmission of the experience of the past. Some more permanent method of preservation was required. The invention of writing was one of the most significant events in human history, as it permitted the accurate and permanent preservation of race experience. The development of writing made necessary the establishment of schools, but, for thousands of years, only the leaders of the race acquired the arts of reading and writing. These arts were not for the common people. It required only a few literate persons in each generation

to record its achievements. When these failed, the records for that generation were largely lost. The invention of movable type and the printing-press, in the fifteenth century of the Christian era, was the next important forward step in the preservation and transmission of the social inheritance. This permitted a wide distribution of books, gave a great impetus to the establishment of schools, and made universal literacy possible.

It will thus be evident that the experiences of the race in the development of the arts of communication have played an important part in the advance of civilization. These experiences are of such fundamental value that, obviously, they should be transmitted to the youth of each generation. It was to be expected, therefore, that the language arts—reading, writing, spelling, and composition—should occupy the basic position on the programme of the school, representing as they do experiences founded upon the age-long need of the race for a medium of communication.

In a similar way, it may be shown that the other studies and activities of the school curriculum embody valuable race experience. Through arithmetic the child participates in the experiences which the race has found useful in securing accuracy and precision in computation. Through constructive work he realizes the means by which the race has turned the materials of nature to human service. Through history he learns how the nation has solved its social and political problems in the past and how these solutions apply to present national conditions. Through geography he participates in the experience of the race in using the world as the background of social life. Through physics he realizes the means by which the forces of nature have been made to

serve human purposes. And so with other school subjects; each represents valuable race knowledge and experience which should be conserved.

We have still to inquire as to the manner in which the curriculum presents to the child this useful experience of the race. Obviously, all of it cannot be communicated. Its extent and quantity make this impossible. Even if it were possible, it would not be desirable, for much would be beyond the powers of the child to interpret, and much more would be of little use in helping him to adjust himself to his present environment. In the first place, therefore, the curriculum selects from the vast storehouse of race experience those elements which are within the powers of the child to interpret, and which are of basic importance in assisting him to adjust himself to the physical, social, and economic conditions amidst which he has to live.

Secondly, the curriculum classifies race experiences, and therefore simplifies the process of interpretation. Without such control in their presentation as is secured through the curriculum, the child would meet these experiences only as they came to him in actual life. In modern society, life is so complex that he would be overwhelmed by their lack of systematic arrangement. Because of their confused and mingled character, the child would not be likely to seize upon them as problems requiring adjustment. The curriculum takes these disordered and incoherent experiences, and puts similar ones together, arranging them under different subjects of study, such as arithmetic, spelling, geography, history, and physics.

Further, the curriculum systematizes race experience by presenting each subject in such a way that the various experiences grow out of one another in a natural

way. For instance, arithmetic arranges the number experiences in a logical order, beginning with those within the grasp of the child, and advancing to the more difficult and complex as the child grows in mental power. So too, geography begins with the child's familiar experiences with his local environment, and advances to a realization of the whole world as the background for human life. Other subjects of the curriculum present their special materials in a similar manner. Thus the curriculum presents race experience in such an order that it may be progressively appropriated by the child in harmony with his growing powers of mind and body.

Still further, the curriculum clarifies race experience, by presenting it apart from the distracting features with which it is associated in actual life. For instance, a number experience may be accompanied by various confusing elements of another kind which may prevent it from being really appropriated. The young man who goes to a bank to borrow money has many other experiences besides that of paying interest on the loan. Negotiation with the manager as to the amount required, the security offered, time of repayment, penalty for non-payment, etc., obscures in a greater or less degree the method of calculating the interest on the loan, and the man may never make of this a problem for his own personal solution. In arithmetic, the needless items are eliminated, and the number experience only (in this case the calculation of the interest) is presented in a pure form. Similarly, experiences of physical phenomena are accompanied in actual life by distracting elements which may prevent the grasp of the physical law. The girl who views the effect of a new hat from various angles in the movable mirrors of her

dressings-table usually has many other experiences besides the reflection of light, and may never make the latter a problem for solution. Physics discards the incidental accompaniments of the experience, and presents the problem of the reflection of light by itself, freed from unnecessary accompanying factors. In other words, the curriculum presents race experience in a pure, unmixed form, so that the child may appropriate much useful knowledge that would not otherwise be singled out from his experiences.

We live in a changing world, a world of continuous progress, a world in which the processes and activities of yesterday are discarded for those that are newer and more appropriate for to-day. Departments of Education and other makers of school curricula should, on this account, be constantly on the alert to see that courses of study are kept abreast of the times. Race experience that has no longer any significance in present-day life should be dropped from courses of study. In this way only can the school curriculum be kept free from the outgrown traditions of a bygone age. Evidences of a desire to be progressive and to avoid fossilization are to be seen in the curricula of Ontario schools to-day. The recent impetus given to technical education is an indication of the tendency to adjust school training to the requirements of practical life. The elimination from arithmetic of problems of mere academic interest, and the substitution of others drawn from the activities of actual life, is evidence of a desire to adapt the subject more closely to the needs of the present day. The omission of constitutional problems from the history taught in the elementary schools reveals a better understanding of the interests and capacities of children. The cessation of the practice of learning lists of names in

geography shows a more rational conception of the purpose of the subject. The attempt to develop an interest in extensive reading in the field of literature indicates an appreciation of its value as a cultural agent. These are merely symptoms of the general tendency of modern educational policy to harmonize the school curriculum with the interests and capacities of children, and with the requirements of the changing social and economic conditions of the times.

An ideal school curriculum should fulfil three important purposes:

1. It should provide a simplified environment, by means of which the essentials of the civilization achieved by the race may be assimilated by the child in a progressive and orderly way.

2. It should eliminate the useless and undesirable in this race experience, and present only those features that will make for the improvement of social life.

3. It should provide for the child an avenue of approach to a richer field of experience than that afforded by the social group to which he belongs, and thus permit him to escape from some of the limitations imposed by his social environment.

PART II—THE LEARNING PROCESS

CHAPTER VII

THE PRINCIPLES OF LEARNING

DURING a summer spent on the shore of Georgian Bay, two small boys conceived the idea of making a raft to push about in the water and to use as a diving stand. Among the driftwood thrown up on the shore they discovered two logs of suitable size and length, and with great toil towed them to a convenient spot for work. They searched the beach and neighbouring wood-piles, and gathered a supply of boards of various sizes. With saw, axe, hammer, and square, secured from the family tool-chest or borrowed from friends, and with nails purchased at the village store, they built a strange-looking craft and fashioned some rough paddles. They even tried to fit up a propeller turned by hand, but this attempt ended in failure. Nevertheless, the two boys derived more pleasure from the use of their crudely-constructed raft than they could have obtained from the finest rowboat or canoe ever built.

This episode of a summer vacation is quoted in order to illustrate the essential characteristics of the learning process. A brief analysis will reveal these characteristics.

SITUATION DEMANDING RESPONSE

First, it may be noted that the activities of the boys grew out of a situation which demanded reaction or response. Here was a fine expanse of water admirably

adapted for riding about and diving in, and no facilities for either activity were present. The boys desired intensely to engage in these activities. The keen feeling of need called forth the idea of a raft, prompted the plans, and guided the activities involved in the construction.

THREEFOLD DIRECTION OF GROWTH

Secondly, it may be noted that the episode illustrates all of the three phases of growth to which reference has so frequently been made. There can be no doubt that the boys grew in precision in the field of habit, or skill. Unquestionably, they discovered better ways of using axe, saw, hammer, and square, and attained greater facility in handling these tools. They acquired greater accuracy in making measurements and in "hewing to a line". In short, they improved considerably in muscular co-ordination and motor control.

Further, these boys grew on the purely intellectual side, that is, in the field of knowledge. The making of plans and the selection of materials for the raft demanded the exercise of imagination and judgment, and thus added something to their powers of thinking. They extended their knowledge of the properties of wood, of the ways of making accurate measurements, and of the methods of using tools effectively.

Still further, the boys grew in the direction of right feeling and volitional attitudes, and this is probably of greatest significance from the standpoint of membership in a social organization. They acquired a respect for each other's opinions, judgment, and skill. They realized the values of careful planning before execution, of precision in measurement and adjustment, of patient, persistent effort in the pursuit of a desirable end, and

of co-operative effort in a common cause. Each boy had awakened in him an admiration of good craftsmanship, and perhaps, also, some sense of the dignity of manual labour. Each experienced the joy of successful accomplishment and acquired some confidence in his own powers to plan and execute. And, most important of all, the future actions and behaviour of these boys could scarcely fail to be influenced by the feeling attitudes thus promoted.

RECONSTRUCTION OF EXPERIENCE

Thirdly, it may be noted, that the growth, or process of learning in the three fields, as outlined in the foregoing paragraph, proceeded according to a definite principle. This principle, fundamental in all learning, can be referred to only briefly at this point, but will be elaborated with greater care at a later stage of the discussion. Its essential significance will be grasped from a few very simple examples of its operation in the learning activity of the boys in the raft episode.

1. On the Knowledge Side

How were the boys able to form a plan for the building of the raft? They might have had some experience with rafts before, through having seen actual examples or pictures or through having heard verbal descriptions. But this was not a necessary condition to planning one. Such ideas as floating substances, wood, logs, boards, nails, hammer, saw, etc., were already in the minds of the boys. They had had experiences with these on former occasions. They had seen bridges and board walks, and knew how these are built. To plan the raft, therefore, they had merely to reconstruct their old experiences in a new form—two logs placed parallel to each other,

boards sawn in equal lengths laid at right angles to the logs, and nailed in place.

2. On the Habit Side

Many physical habits were brought into play in the activities of the boys in constructing the raft. Some of these, such as grasping, pulling, pushing, lifting, were already fairly well established. Driving nails was less firmly fixed, and sawing not at all. In initiating the last-named habit, the boys had to recall memories or images of the use of the saw by others, and then reconstruct such old habits as grasping, pulling, and pushing with the hand and arm into the new activity of sawing. This process of reconstruction of action and habits in new ways is characteristic of the beginnings of new habits.

3. On the Attitude Side

Among the many feeling and volitional attitudes accompanying the activities of the boys, we may single out for brief analysis that of respect for each other's skill and judgment. Each boy had had numerous past experiences of the feeling of admiration for excellent qualities. He had doubtless often admired good pictures, stories, brave deeds, unselfish actions, etc. In the present instance his perception of excellence in his companion's skill and judgment was associated with his characteristic feeling of admiration in the presence of excellence. In other words, even in feeling attitudes there is to be found the application of the principle of the reconstruction of experience.

We have devoted considerable space to the analysis of an illustration of the learning process in order to impress three facts:

1. The learning activity is initiated by some situation demanding reaction.

2. Learnings in the three fields of knowledge, skill, and feeling are simultaneous and coincident; they are inseparable processes, distinguishable, it is true, and lending themselves to separate examination, but never existing independently of each other.

3. The learning activity proceeds in conformity with a well-defined principle—the reconstruction of experience.

We shall now proceed to a more detailed discussion of the activities involved in the three fields in which the learning process occurs.

CHAPTER VIII

LEARNING AS HABIT FORMATION

IN CHAPTER II it was briefly indicated that there are three characteristic forms of response to stimulation from the environment—hereditary, habitual, and conscious. Each differs from the others in certain features, but each intermingles with the others in the most complicated ways in the individual's behaviour. Again we may remark that the three types of response are inseparable, but are distinguishable for purposes of analysis.

HEREDITARY MODES OF RESPONSE

As has already been noted, psychologists are by no means agreed as to which activities are hereditary and which are acquired. Certain responses that, a decade or two ago, were generally regarded as native or inherited, are now in some quarters claimed to be acquired, in part at least. Consequently, statements in regard to this type of response are made with some reservation. However, there seems good reason for belief that certain simple forms of reaction observable in the child at an early age are inherited. For instance, when the palm of the hand is touched, the infant clasps his fingers; when the lips are stimulated, sucking movements are set up; when cold water touches his skin, he cries; when he hears a loud noise, he starts violently. Such simple responses are called *reflex* actions.

Somewhat analogous to these are the child's tendencies to pull himself into an upright position, to walk, to make babbling sounds, to explore things with the hand. These actions are more complicated than the reflexes, but are

probably of similar character fundamentally. It is more difficult to speak positively in regard to them, because of doubt as to the extent to which they are affected by experience. But we are probably safe in saying that the original tendencies to perform these actions are inherited characteristics, however early they are influenced by the experience of the child. From that point of view, we may call them *instinctive* actions.

Reflex and instinctive actions are the earliest forms of response to stimuli in the life of the child. They constitute the foundation upon which all his later complex activities are based. When they are modified by experience, as many of them are, they are said to become *conditioned*, or responsive to stimuli different from those with which they were originally connected. For instance, the original stimulus to walk is some inner urge accompanying a feeling of strength in the muscles, which spurs the child to pull himself upright. Later the same stimulus prompts him to attempt to step forward. At this point, the mother perhaps plays some part in the child's learning to walk. She encourages him to take a step or two towards her, or perhaps she places an attractive object where he can reach it by means of a few steps. Or, it may be the child is urged by his own interest in the activities about him to attempt to walk on his own account. In any event, the original stimulus to walk has been replaced by another stimulus, that is, the instinctive tendency has become *conditioned*. Most of the inherited tendencies are sooner or later subject to this process of conditioning.

HABITUAL RESPONSE—THE CULTIVATION OF SKILL

The significance of the inherited types of action, from the educational standpoint, lies largely in the possibility

of their being evolved into conscious or habitual actions. The child begins life with a few native motor tendencies that are at first under no conscious control. In the course of time, these are conditioned, and eventually developed into the countless forms of motor activity exhibited in human conduct. How is this transformation achieved?

First, let us answer the question so far as it relates to habits. A moment's reflection will show that they fall into two types. Habits such as reaching, grasping, walking, running, climbing, are acquired incidentally without conscious direction or purpose. On the other hand, habits such as dressing ourselves, writing, playing the piano, operating a typewriter, or driving a car, are consciously developed. We shall consider the two classes separately.

1. Habits Informally Developed

The reaching and grasping habits may be taken as typical of the class of habits that are unconsciously acquired; and an analysis of the process of developing these will reveal the principles underlying all the others of the same type. Let us suppose that a bright-coloured ball is placed before a child a few months old. He has an impression of a pleasing object through his sense of sight. The stimulus, in this case a sensory experience, has its characteristic response in instinctive movements of the bodily organs. The child smiles and utters delighted vocal sounds. His head, arms, and legs move in the violent and spasmodic fashion characteristic of infancy. Let us suppose that, in the midst of this mass of purposeless movement, the child by accident touches the ball with his hand. Instinctively he grasps it, and has another pleasing sensory experience through the avenues of the skin and muscles. A vague memory

of the pleasant experience will probably be retained by the child, and will tend to produce a repetition of the same movements when next he sees the ball. On subsequent occasions, there is, for a time, a repetition of the same excess of response, but gradually the needless movements drop away, and soon the child reaches for and grasps the ball with a minimum of muscular movement. He has not only gained through sensory avenues ideas of the object which will in some way be retained, but he has also formed a habit of reaching and grasping which will presently be transferred to other objects. This illustrates the beginning of the muscular control which is involved in all the other habits of this type.

2. Habits Consciously Acquired

Habits that are consciously developed obviously depend upon consciously performed actions. Our first problem, then, is to explain how the child acquires the ability to perform actions at will. By fixing attention upon his reflex or instinctive acts, the child obtains ideas of what it "feels like" to perform certain movements. For instance, by attending to the blinking of the eye—a reflex act—the child secures an idea of the movement. By recalling this idea, he gradually gains the ability to perform the movement voluntarily, at first imperfectly and with difficulty, but in time with ease and rapidity. Motor control thus gradually develops. Numerous other voluntary actions are acquired in the same way. As time goes on, the child develops the ability to group together his simple movements in various combinations, that is, he learns to reconstruct his movements. Thus he is able to perform voluntarily more and more complicated physical actions. When this stage of motor control is reached, the child is equipped to establish habits in a voluntary way.

The origin and development of this type of habit will best be understood from illustrations. Take first the case of a boy learning to tie a bow knot. He desires to do this, in order that he may effectively fasten his shoe-laces in such a way that they will easily be released when necessary. That is, he has a motive for the acquisition of the art. It will thus be evident that this is a situation in real experience which demands response. The boy looks carefully at a bow knot and observes its general appearance. He watches another person demonstrate the procedure in tying the knot, and gives close attention to the form and order of the movements made. Then he tries it himself, probably fails, observes another demonstration, learns the cause of his failure, and tries again. The trials continue in this way until success is achieved, though the first product is more or less crude. He notes where the knot could be better formed and tries again and again, improving with each successive attempt till at last the result is satisfactory. The thrill of pleasure that he experiences when he succeeds acts as a spur to repeated trials, till his technique is nearly perfect. The time will eventually be reached when the boy will tie his shoe-strings in a bow knot mechanically.

A similar procedure is followed in the establishment of practically every other physical habit. The girl learning to make button-holes, the electrician learning to make a joint in a wire, the carpenter learning to plane a true surface, the tennis player learning to make a back-hand stroke, the pitcher learning to make the ball curve—all must go through the same procedure in the acquisition of the habits they wish to establish in their lives.

The stages in the development of habit through conscious control will be evident from the illustrations given. They are as follows:

1. A situation which makes the performance of a particular action desirable. The boy wishes to tie a bow knot because it holds his shoe-laces securely and is easily loosed. The girl wants to fashion button-holes properly because these are an essential feature of an apron or a dress that she is making. In other words, there is a motive for performing the action.

2. A clear idea of the procedure in carrying out the operation, a knowledge of the order and form of the various movements and of the ideal result.

3. An attempt to perform the operation.

4. A comparison of the result with the ideal, noting where success has been attained and failure has occurred.

5. A conception of the new ideal, a second trial and comparison, and so on till success has been achieved.

6. Attentive repetition of the successful operation, until the mechanism has been established.

VALUE OF HABIT

From the discussion up to this point, the reader will infer that habit is a great time-saving and labour-saving capacity with which humanity has fortunately been endowed. It enables one to achieve remarkable facility and quickness in the use of numberless objects in the environment. In the industrial world, it permits human beings to perform actions connected with various phases of manufacture with marvellous precision and rapidity. One has only to visit any factory producing goods on a large scale to be impressed with this fact. Habit greatly increases human efficiency in the trades and occupations. The machinist, the carpenter, the bricklayer, the plumber, the electrician have acquired a set of physical habits which immensely augment their usefulness in the service they render to the community.

A further obvious advantage of habit is that it relieves the individual of the conscious supervision of countless mechanical actions and leaves him free to engage in higher intellectual activities. He would have very little time or energy for the solution of serious problems, if he had consciously to direct all his numberless habitual activities in the same way as the small boy of our illustration when he first attempted to tie a bow knot. A world of human beings without the capacity of habit would be a society capable of little intellectual advancement and of little practical efficiency.

As has been already intimated, habit, in the form of physical skill, plays a very important part in the field of industry. But there are skills and skills. That of the machine operator in the factory represents one type. The man at the punch press and the girl at the power-operated sewing-machine have merely to repeat over and over a few simple movements hour after hour, day after day. They acquire marvellous mechanical dexterity in a comparatively short time, and their movements become as precise and regular as those of the machine at which they work. There is little or no occasion for conscious thought, for the exercise of judgment, or for the solution of practical problems connected with their work. The danger of making a mere automaton of a human being is evident. The salvation of such a workman must lie in the cultivation of some outside interest which will give his mental powers the stimulus and exercise that the daily work of the factory denies.

In contrast to this type of skill stands the skill of the trained mechanic. Consider the case of the carpenter. He must, of course, have physical dexterity in the use of the tools of his trade and the management of his materials. The more mechanical skill he cultivates, the more

efficient his work is likely to be. But, in addition to this manual ability, he must use his intelligence. He must imagine the completed work before it is begun; he must judge as to materials to be used and the way to use them; he must reason regarding measurements and adjustments; in other words, he must think. This is equally true of other trades. The essential element which distinguishes the activities of the mechanic from those of the workman referred to in the preceding paragraph is the element of conscious thought that must accompany the physical skill. In other words, the distinguishing characteristic of the "skilled" workman is intelligence combined with manual dexterity.

It should be noted in conclusion that, while fixed habits may be valuable resources which are always at hand for the adequate meeting of new situations, they may also be ruts which mean a lack of originality and initiative, and, consequently, a positive disadvantage to the possessor. There is always a danger of fossilization. The preventive for this condition is a constant review of the habits one has formed and a constant modification of them in the direction of newer and better ways of performing the routine actions of daily life.

CHAPTER IX

LEARNING AS ACQUISITION OF KNOWLEDGE

IT HAS been repeatedly pointed out in previous chapters that one of the phases of the child's growth is an increase in knowledge. Let us briefly trace the mental activities by which this knowledge is secured. We shall make no attempt to analyse minutely the psychological processes, but shall merely refer, in the most general terms and in the barest outline, to the various ways in which the mind builds up its store of information.

Knowledge begins in sense perception. The human being is provided with specialized sense organs through which he obtains mental impressions of colour, sound, taste, odour, contact, pain, temperature, strain, etc., which are known as sensations. As suggested in another connection, the child does not receive these impressions in a merely passive way. He has hereditary tendencies to movement, which impel him to reach out for the stimulations which his environment thrusts upon him. This tendency is intensified by a sort of hunger for sensory stimulation, which the child exhibits. Because of his characteristic quality of plasticity, he retains in the form of images the impressions received through sensory avenues, and is able to recall them when needed. Soon the stage is reached when he recognizes objects through the medium of sensory stimulation. A single sensation of yellow, for instance, becomes a symbol for a group of other sensations of taste, odour, contact, pressure, etc., which have occurred in association with it in the past, and the child recognizes an *orange*. This is a *percept*. It involves the combination of some actually present

sensation or sensations with images of former sensations, the result being the recognition of an object. These sensory experiences of the objective world constitute the basis of the child's mental life, and form the raw material, as it were, out of which his subsequent mental products are evolved.

It was stated above that the human being has the power to retain and revive his sensory experience. Without this ability he would be incapable of any mental activity; he would be merely a being capable of sensory impression, but with no capacity to learn from what happened to him, for every sensation would be an entirely new experience, with no relation to the past. The powers of retention and recall, in the first place, raise the individual from the plane of mere sensation to the plane of sense-perception, where he learns from experience and is able to recognize objects which stimulate his sense organs. But this does not carry him very far. Retention and recall are further reinforced by the process of reconstruction, to which reference has already been made in the discussion of habit. The individual is enabled to recombine his images in different forms, in response to the various situations with which he is confronted. Thus mental growth is shown in two closely connected stages—(1) in the acquisition of imagery which forms the early mental content, and (2) in the reorganization of this imagery in varied combinations to meet new situations.

The earliest reconstructions of experience are those on the sense-perception plane. For instance, when a little child recognizes his teddy bear on the floor across the room, it is because he has come to regard a certain colour sensation as a sign of a whole group of other sensations with which it has been associated in the past. The child who called the stars "little lamps hanging in the sky",

reconstructed familiar sense-perceptions and images in a new form to give meaning to his experience.

A second phase of the reconstruction of experience comes in the formation of general or universal ideas. The child's perceptions are of particular, individual things. He perceives, for instance, this big, red, soft ball now present to his senses. But in time he has experiences with other balls with other qualities. Eventually, he groups the like qualities together into a general idea, *ball*—a round thing to roll or throw. This is a *concept*, an idea of a class, formed early in the child's experience, but subject to constant modification as his contact with individual objects expands. A concept is an idea which comprehends the common qualities of a large class, an idea which is used as a symbol for a multitude of objects, and which, on this account, greatly simplifies the individual's thinking. Conception represents a higher form of mental process than perception in that it involves a definite recognition of relations.

When a child identifies an object before him as his ball, he has a percept. But he may be in momentary doubt as to its identity; for instance, he may be unable at once to determine whether it is his ball or his brother's. If, after examination, he decides that it is his ball, he illustrates a still higher mental process, namely, *judgment*. In his decision, "This is my ball", he has mentally set up a relation between a percept represented by "this" and his idea "my ball". Judgment is the affirmation of a relation between ideas, a reconstruction of ideas expressed in a definite statement after due deliberation.

The highest and most complicated form of the reconstruction of experience consists in the establishment of a relation among judgments. This is *reasoning*. It has two characteristic forms which will be evident from a

simple illustration. Suppose a child accompanies his father in a drive by motor car through the streets of a city. They come to a red light on a post at the side of the street. His father stops the car; the other drivers going along the same street stop their cars. The light changes to green; his father starts again; so do the other drivers. At the next corner the light is green; his father does not stop; neither do the other drivers. The experience is repeated several times during the ride. Presently the child concludes that the red light means "stop", and the green light "go ahead". He has reached a general conclusion from particular examples. This is *inductive reasoning*.

Now, having possession of the general law, he applies it in particular cases. If he sees a red light, he concludes, "We shall stop here"; if he sees a green light, he says to himself, "We shall go ahead". To use another illustration, suppose the child looks out of the window of his room, and, noticing the smoke floating northward from a neighbouring chimney, says, "The wind is blowing from the south". In these cases he is proceeding by *deductive reasoning*—the application of a general law to explain a particular case.

All these mental processes thus briefly outlined—a more extended treatment will be presented in Chapter XXIII—are means whereby our knowledge is built up. It must not be supposed, however, that they are distinct processes operating by themselves independently of the others. As a matter of fact, they are constantly interweaving with each other in complicated ways. As we have remarked in other connections, the processes are distinguishable but not separable. This will be more apparent in subsequent discussions.

CONSCIOUS REACTION—PURPOSEFUL THINKING

We are now in a position to determine what is involved in purposeful thinking. Here again an illustration will be of assistance.

A small boy was walking to school one spring morning along the side of a country road. Between him and the road lay a deep ditch swollen by the waters of a recent rain. It was necessary for him to cross the ditch to gain the road to reach the school. His first impulse was to jump across the ditch, but he was restrained from the attempt by the width of the ditch and the depth of the water. He next considered the idea of walking a quarter of a mile farther and crossing by a bridge over the ditch from a farmer's driveway. This plan was rejected, because of the long distance and the probability of being late for school. The idea of using a rail from a pile of discarded fence material near at hand was dismissed, because of the unstable character of a crossing thus constructed. But it occurred to the boy that several rails might be placed close together parallel to each other across the ditch, thus forming a fairly substantial bridge. The plan was put into execution, and the boy was able to cross dry-shod and to reach the school in time.

The incident here described will be recognized as an example of a conscious reaction to a stimulus, in contradistinction to the hereditary and habitual responses described in the preceding chapter. It is equally an example of a complete act of thought, and an illustration of learning in the sense of acquiring knowledge. If we can find out the processes involved, we shall have discovered the principles underlying all thinking. A careful analysis of the incident will reveal the following essential elements:

1. The boy was faced with a situation requiring action, namely, the necessity of crossing the ditch to reach the school. This situation constituted a difficulty to be overcome, a problem demanding solution.

2. The problem stirred the boy's mind to activity. The ideas of jump, bridge, rail, among many others, occurred to him as possible aids in meeting the situation. From what sources did these ideas come? If he had not had experiences of these things before, he could never have recalled them. They were all in his past experience, having been used in various ways in previous difficulties. He had jumped over ditches, crossed bridges, walked on rails, etc., before. Among the many ideas that "popped into his mind" in the face of his present problem, these were singled out because they seemed to have some reference to the solution. They were combined or related in tentative plans which might meet the situation. These various plans are worth considering in detail.

If the boy's thinking in the first plan were set forth in a formal way—not, of course, as it occurred in his mind—it would be somewhat as follows: "I might take a short run, make a big leap, and perhaps reach the other side of the ditch". Further ideas, such as wide ditch, short jump, deep water, wet clothes, discomfort, come flocking up from past experience. Setting up relations among these, he thinks: "I cannot jump across, I should fall into the water; my clothes would get wet; I should be uncomfortable all day; and I should have a bad cold to-morrow". So this plan was rejected as being an inadequate method of meeting the situation.

The second plan—proceeding to the bridge farther on, crossing, and walking back to the school—may be similarly analysed. Obviously the ideas constituting it came from the boy's past experience. Stated formally, his

thinking might be set forth in this manner: "I could safely cross by the bridge at Mr. Brown's driveway. But that is a long distance away. I do not like to walk so far. Besides it would take me fifteen minutes to get there and back, and it is now five minutes to nine. I should be late for school". So this plan was also rejected.

In the expedient finally adopted by the boy, the mental processes might be indicated in the following way: The ideas—fence materials, rails, parallel arrangement across the ditch, bridge, steady footing, etc.—were seized upon as promising possibilities as they came forth from various past experiences, and were organized or related in a plan that was believed to be feasible. "I shall take several rails from the heap; I shall lay them close together side by side across the ditch so that they will neither roll nor spread apart; and then I shall walk safely and dry-shod across to the other side".

3. Up to this time the plan has existed only in the mind of the boy as a satisfactory solution of his problem. If it remains merely as a mental condition, it is of no value under the existing circumstances. It must be carried out in action, if it is to have any practical purpose. So the boy applies or expresses his mental solution of the difficulty by making the appropriate movements to put the plan into execution.

Our illustration may be analysed also from the standpoint of the various phases of thinking outlined in the earlier part of the chapter. We shall find examples of all these phases mingling in apparent confusion, but actually in orderly fashion. The boy had *percepts* of the ditch, the water, the fence rails, the bridge at the farmer's driveway. His ideas of jump, cold, long walk, safe footing, time for school, etc., were *concepts*. He formed *judgments*, when he decided that the ditch

was too wide to jump across and the distance to the farmer's bridge was too far to walk in the time at his disposal. He *reasoned inductively* when he recalled various experiences of crossing ditches and ponds by means of logs, planks, stepping-stones, etc., and decided that the thing to do was to make a bridge of some sort. He *reasoned deductively* when he decided that, if he fell into the water and remained in school all day with wet clothes, he would have a cold on the following day.

The instances given above do not exhaust all the examples of the various phases of thinking in which the boy engaged. The reader will find it profitable and interesting to locate other examples in the illustration, and he will not fail to note how the various processes are interwoven in seemingly haphazard ways in a thinking process that as a whole is most systematic and orderly.

This somewhat protracted analysis of an apparently simple incident has revealed the following features of a conscious response or an act of thought:

1. As a stimulus to thinking or conscious reaction, there must be a real problem developing within a genuine situation or experience.

2. To meet the difficulty, there must be data at hand in the form of ideas of things, qualities, actions, events, etc. The situation to be met must be sufficiently like former situations of experience to give control of the elements to be used in dealing with it. These elements are provided largely by the processes of perception and memory.

3. The ideas thus provided must be carefully considered as to their suitability, and organized into tentative solutions. Some of these solutions may be rejected as unsatisfactory under the existing conditions. The

solution finally determined is the one that appears most feasible. In planning the solution, various phases of the thought process—imagination, judgment, and reasoning—are brought into play in great complexity of combination.

4. The chosen solution must be tested by practical application, in order to determine its validity.

In brief, the processes involved in a conscious response may be stated as follows:

1. A problem to be solved, a difficulty to be overcome, a need to be satisfied, a situation to be met.

2. A reconstruction of elements of past experience having some relation to the situation, to form a plan of procedure, and the testing or application of the plan in action.

A UNIVERSAL PRINCIPLE IN LEARNING

One further feature of the learning process remains to be noted, though it is not essentially different from that presented in the foregoing paragraph. It has long been a familiar maxim of pedagogy that, in learning, the mind proceeds from the indefinite to the definite, from a vague, nebulous, indistinct idea to a clear, defined, organized idea. What this maxim means and what its relation is to the learning process as described above will be clear from the following illustrations.

Suppose a small boy is given a momentary glimpse of a new pocket-knife. The fleeting sensory stimulation that he has will probably suggest the identity of the object. He has a vague idea of a whole object, which his concept, pocket-knife, enables him to identify. The only positive knowledge that he has as yet is that the knife is white in colour, though he may suspect that it has the usual characteristics of pocket-knives. Let him

have another brief glance at it. This time, by an act of attention, he perceives that there are two blades and that the handle has brass ends. His knowledge has grown somewhat in the direction of greater definiteness. Now, let the boy have some time to examine the knife carefully to see how much he can find out about it. Looking first at the handle, he finds that it is made of white bone, and that it is held together by three brass rivets, one at each end and one in the middle. Further examination shows that there are two sharp, shining, steel blades, the larger of which has the manufacturer's name engraved at the foot. It will be noted that the boy has secured greater definiteness in his knowledge by noting the details of the larger parts of the knife—the handle and the blades. Moreover; it will be observed that he has “read into” the knife certain characteristics of which he has had experience in the past. Still further examination of the knife reveals two novel features. One is a blade with rough surfaces, which the boy, falling back on his old experience, interprets as a nail file. The other is a twisted wire-like attachment, which former experience also enables him to interpret as a corkscrew. If the boy is now permitted to try the sharpness of the blades and to test the efficiency of the nail file and corkscrew, his knowledge of the knife may be regarded as fairly complete.

Three points will be noted as emerging from this illustration:

1. The boy had a motive for his careful examination of the knife. It was a new and interesting object, and he had been put on his mettle to find out all he could about it.

2. The features that he “discovered” in the knife had all been present before in his past experience. The

particular organization of these features was new. He had not met them before in exactly that combination.

3. The boy's knowledge of the knife was at first vague and indefinite, but through attention and the recall and reorganization of past experiences, it grew progressively more and more distinct and defined.

The same principles may be traced in the growth of a man's knowledge of the engine of his motor car. At first the engine may be to him nothing more than a big machine consuming gasoline and somehow producing power to propel the car. By watching a mechanic make adjustments or repairs, he acquires some knowledge of the functions of various parts. By studying a diagram, he may find out the uses of other parts and their relation to each other. If he learns how the gasoline is vaporized in the carburetor and how the electric spark is timed to produce successive explosions in the cylinders, he has gone a further distance towards understanding the mechanism. If he appreciates the expansive force of exploding gas, he will understand how power is produced to turn the crank shaft. And so with the rest of the mechanism. The man's knowledge of the engine grows gradually from a vague idea of the whole to a clear and defined idea of the whole through the progressive reorganization of former experiences.

The principle here enunciated is fundamental in all learning. The procedure is always from the indefinite to the definite, through analysis and the perception of relations among parts and details. One's knowledge of anything may be said to be complete when he grasps all the relations that are involved therein, when he perceives how every feature is related to every other feature to produce one interdependent and harmonious whole. That such complete knowledge is ever possible

one may well doubt. We are compelled to acknowledge that there are relations among things that must forever elude the grasp of the human mind—an acknowledgment which the poet voices when he says:

*Flower in the crannied wall,
I pluck you out of the crannies;
I hold you here, root and all, in my hand,
Little flower; but, if I could understand
What you are, root and all, and all in all,
I should know what God and man is.*

CHAPTER X

LEARNING AS ACQUISITION OF ATTITUDES

IN OUR illustration of the boy and the ditch in the last chapter, we laid the chief emphasis upon the intellectual aspect of the mental process. Equally important, however, are the emotional and volitional attitudes, of which examples are to be found in the same illustration. In this case, as in all other mental states, the three phases, the intellectual, the emotional, and the volitional, are inseparably associated, but are easily distinguished upon analysis. For instance, the idea of the ditch as a barrier to reaching the school was accompanied by a disagreeable feeling tone and also by a striving for a means of overcoming the difficulty. Similarly, the idea of attempting to jump across the ditch, with the probability of falling into the water, had a disagreeable feeling tone, with a tendency to dismiss the plan as unfeasible. So also, the idea of making a temporary bridge of rails, with the prospect of successfully realizing the end, was accompanied by a feeling of pleasure and a tendency to put the plan into effect. The whole situation involved, (1) ideas of an end and of possible means of realizing this, (2) a desire, amounting almost to anxiety, to discover a solution, and (3) deliberation upon various possible lines of action, choice of the most feasible, and execution of the chosen plan. The intermingling of the three elements of knowledge, feeling, and volition, in the action will be clearly evident from these examples.

It is important, as pointed out in the preceding chapter, that the child should grow in knowledge. But, along with this, it is essential that he should grow in desirable emotional and volitional directions. In fact, the individual's value to society will consist, in no small measure, in the kind of feelings he develops and the kind of conduct he exhibits. Fortunately, development in each of the three fields usually occurs as a result of one and the same kind of activity. To a very large extent it is true that the acquisition of the right kind of knowledge will be accompanied by the cultivation of the right emotional tendencies and the development of right modes of behaviour.

FORMS OF EMOTIONAL TENDENCIES

Let us first briefly outline the principal emotional tendencies. As has been already indicated, ideas are tinged with *feelings* of pleasure or unpleasure of varying degrees of intensity. The perception of a smooth green lawn is accompanied by pleasure, the perception of a neglected weedy garden by unpleasure. The memory of yesterday's success is pleasurable, the memory of its failure is unpleasurable. The prospect of a holiday trip next week is agreeable, the possibility of financial loss is disagreeable. All ideas have these accompaniments of pleasant or unpleasant feeling tones ranging in degree from the very slight to the very intense.

Feelings that are greatly increased in intensity and involve considerable disturbance of the bodily functions are usually called *emotions*. For instance, the emotion of fear, occasioned, let us say, by the consciousness of a ferocious animal, bright flashes of lightning and loud crashes of thunder, or a situation involving serious danger, is accompanied by general bodily symptoms,

such as increased heart beat, paling face, tense muscles, cold perspiration, then perhaps screaming and flight. Similarly, grief occasioned by a tragic occurrence is accompanied by general disturbance of the whole organism, involving tears, weeping, sobbing, and wringing the hands. The little girl's delight over a prospective visit to grandmother is expressed in shouts, laughter, clapping of hands, jumping up and down, and rushing about. The emotion is the whole mental state including the idea, the feeling, and the general bodily response.

Emotions are more or less transient conditions; they usually come quickly, express themselves, and then disappear. Often, however, they leave behind them more or less prolonged emotional states, usually called *moods*. Our anger over a wrong or an insult may expend itself quickly, but leave behind it for a considerable time a mood of resentment against the author or perhaps a mood of regret over our unseemly expression of the emotion. Moods appear to be the accompaniment of certain physiological states, such as hunger, fatigue, bodily pain, or their opposites, together with the type of ideas that are naturally associated with these states. We alternate between moods of happiness and sadness, of optimism and pessimism, of exaltation and despair, depending upon the feelings associated with our bodily states and our ideas of the moment. It will be apparent that, usually, we should be able to withdraw our minds from the contemplation of disagreeable physiological conditions and unpleasant ideas. Consequently, we should be able to determine our moods by choosing the type of ideas upon which we allow our minds to dwell. We must, therefore, to a large extent accept personal responsibility for our moods of the moment.

The principle of habit operates in the field of emotions to produce what are usually called *dispositions*. If we frequently indulge in happy moods, we cultivate a mood habit in that direction, and we say that we have a happy disposition. Thus we may cultivate dispositions of kindness or unkindness, of generosity or ungenerosity, of fairness or unfairness, of equability or irritability, according as we habitually fashion our moods in right or wrong ways. It will be noticed that we are responsible for the kind of dispositions we develop through our choice of the moods which we habitually indulge. It may be inferred, also, that the type of moods we exhibit determines, to some extent, whether we are agreeable or disagreeable members of the social organism.

All these forms of emotional tendencies are exceedingly important in our lives, but the highest and most complete form is what is usually called *sentiment*. One of the most universal forms of sentiment is love for one's mother. In his early years the child associates his mother with many forms of pleasurable experience. She supplies his wants, feeds and warms him, and ministers to his comfort in a thousand ways. As he grows older, he comes to appreciate her labours and sacrifices for his sake. The sentiment of filial affection thus involves a large knowledge element. It is a permanent emotional tendency; the child's moods may change with varying conditions, but his love for his mother is unchanging under all circumstances. Similarly, with the sentiment of patriotism. Every Canadian has a just pride in the vast extent, the rich resources, the invigorating climate, and the intelligent and industrious population of Canada. He realizes the opportunities this country offers for his material advancement, and the liberties he enjoys as a citizen. He gradually learns something of her history—

of the persistence of her explorers in penetrating her far-flung plains and mountains, lakes and rivers; of the endurance of her pioneers in settlement; of the sagacity of her statesmen in laying the foundation of political liberty; of the courage of her soldiers in the defence of her shores from invasion. He appreciates the ideals of service and achievement which these men have passed on to him. Concurrently with this growth in knowledge, there develops the sentiment of patriotism—a permanent emotional state, independent of transient feelings and moods. Similar characteristics will be found in other desirable sentiments, such as loyalty to one's friends or school, consideration for the aged and helpless, love of nature, artistic appreciation, civic pride, and reverence for God, which develop gradually with the growth of experience and knowledge.

VOLITIONAL SIDE OF EMOTIONAL TENDENCIES

The knowledge content of all the emotional states outlined above has been frequently referred to throughout the discussion. It remains to point out that all have their volitional phase as well. There is always a tendency to continue and bring into clearer consciousness any idea or train of thought which is tinged with pleasure, and, on the contrary, to dismiss or strive to get rid of intellectual states that are disagreeable. Each emotion, mood, and disposition has its characteristic and natural method of response. Sympathy expresses itself in kindly words and acts; curiosity, in the tendency to investigate; filial affection, in tender care and service; patriotism, in striving to advance the welfare of one's native land; reverence for God, in the performance of religious duties; and so forth. But this is only another way of saying what has so frequently been insisted upon, namely, that

the knowledge, feeling, and volitional phases of the mental process are coincident and inseparable.

CONDITIONS OF EMOTIONAL GROWTH

We have next to inquire as to the conditions upon which emotional growth depends. It will be observed that they are the same as those that operate in the development of bodily control and intellectual power, namely, the occurrence of some situation of experience calling for the activity. For instance, suppose a boy observes a blind man standing at a street crossing evidently waiting for help to reach the other side. The ideas of the man's handicap, his helplessness, and his need of assistance are accompanied in the boy's mind by an emotion of sympathy and an impulse to help the man across the street. Or, suppose somebody makes disparaging remarks about a boy's dearest friend. The ideas of the integrity of the friend and the undeserved disparagement by the speaker stir the sentiment of loyalty and the emotion of resentment, and the boy rushes to a hot defence. It will be observed from these illustrations that we are face to face once more with the well-known conditions of growth, stimulus and response. The stimulus in the case of emotional growth is the presentation of some situation to which the individual must adjust himself, and the response is the calling forth of ideas or the formulation of plans to which feeling tones and emotions are attached.

It will be inferred from the foregoing analysis that emotional growth is a more or less unconscious by-product of activity, rather than something that is striven for consciously. It was pointed out in a former chapter that much of the child's knowledge, especially during his earlier years, is acquired informally and more or less

accidentally through contact with his environment. His emotional growth is of the same informal character. The casual activities of the home and association with others are invariably attended by ideas which in turn are accompanied by feelings and emotions. That child is fortunate who lives in an atmosphere of peace, harmony, and happiness, who is constantly surrounded by objects of beauty and worth, who listens to elevating music and good stories, and whose natural energies have a suitable field in which to exercise themselves. Such a child can scarcely avoid if he would an emotional development in desirable directions. On the other hand, how sad is the fate of that child who grows up in an atmosphere of ugliness, discord, and strife, and whose life is one long succession of unpleasant experiences, with few bright spots to relieve its depressing drabness. Such a child's emotional development will, in all probability, be largely in wrong directions.

It should, however, be pointed out that emotions are more elusive than ideas, and that, therefore, emotional growth cannot be directed with the same certainty as intellectual growth. We may be fairly sure that a child has certain ideas, but we cannot always be equally sure that these are accompanied by the feeling tones or emotions we anticipate. We may test with fair accuracy whether he has possession of particular information, but we have no precise means of measuring his emotional experiences. This is true, not only of the child's growth in an informal way, but also of the growth which is consciously directed through formal channels. We may lead him to the intellectual apprehension of new ideas through directing him in the reconstruction of his old knowledge, but we cannot with certainty insure his

undergoing the emotional experiences which ordinarily might be expected to accompany these ideas.

This does not mean, however, that the child's emotional growth is to be left to chance. It can be controlled indirectly through the application of three principles.

1. The first of these three principles has already been suggested. Emotions may, to some extent, be controlled through the ideas which find a place in the child's mind. A favourable environment, unregulated or regulated, will stimulate ideas to which worthy emotions are attached. During the child's early years it is important, therefore, that the home and the school should provide a suitable environment for the stimulation of proper intellectual activity, and thereby insure, as far as possible, a proper emotional activity.

2. The second principle is that emotional growth may be secured through suitable direction of the expression of the emotions. The child tends to repeat those activities which are accompanied by a feeling of pleasure, and to avoid those which are accompanied by unpleasure. This law has a very wide application. In given situations, his desires stimulate him to act in particular ways. For instance, suppose he does not wish his companions to play with his toys and exercises his prerogative in that direction. The disapproval of his companions or perhaps of his mother, under this condition, is attended by a disagreeable feeling which is unfavourable to the repetition of the act. On the other hand, if he allows his companions to play with the toys, the perception of their gratitude and the approval of his mother is accompanied by a pleasurable feeling which is likely to result in similar action in the future. Soon the satisfaction that he feels when he performs acts of kindness, unselfishness, and

generosity becomes a motive for entertaining kind, unselfish, and generous ideas and feelings, and in time feeling habits or dispositions in these directions are established. On the other hand, the discontent he feels when he entertains unkind, selfish, and ungenerous ideas and emotions becomes a motive for avoiding them. And so with other emotional tendencies. The satisfaction he experiences when he feels and acts in desirable ways, and the dissatisfaction he experiences when he feels and acts in undesirable ways, constitute the motives at the basis of proper emotional development.

3. The third principle of emotional growth is contagion. Nothing is more "catching" than feeling. We have constant and abundant evidence of this everywhere. Our companion's mood of cheerfulness communicates itself to us; the enthusiasm of the leader is caught by his followers; the fear of danger by a few individuals spreads among the crowd, and in a moment becomes a panic; a single player's spirit of fairness soon permeates the whole team. In view of this well-known law of emotion, the importance of surrounding the child with associates having desirable emotional tendencies will be apparent. The interests, appreciations, enthusiasms, and sentiments, of parents, teachers, and companions are in some mysterious way communicated to the child and gradually established as permanent feeling attitudes.

CONDITIONS OF VOLITIONAL GROWTH

Much of what has been said about emotional growth might be repeated with reference to volitional growth. Reference has frequently been made to the inseparability of the two; ordinarily they go forward together hand in hand. Feeling attitudes of sympathy, fairness, and generosity tend to express themselves in actions having

similar qualities which, later, are consolidated into moral ideals. A keen desire to attain an end stimulates effort to realize it, which, when frequently repeated, results in the general volitional attitudes of industry, persistence, self-reliance, and originality.

The principles upon which volitional growth depends are the same as those which operate in intellectual and emotional growth. There must be a situation of real experience within which a problem or difficulty appears, and there must be response in the form of effort to solve the problem. The illustration used in a former chapter, of the boy and the bow knot, furnishes an example of the application of the general principles in the development of volitional attitudes. There was a situation creating a desire—a pair of shoe-laces that he wished to be able to tie effectively and loose easily. There was a conception of an end to be realized—the ability to tie a bow knot. The desire to attain the end was strong enough to sustain several careful examinations of the method of tying the knot, and several unsuccessful attempts to master the technique. The first partial success was accompanied by a sense of satisfaction which, however, was not so complete as to allow him to give up trying. The satisfaction grew greater with each success, and acted as a spur to keep him trying, until his technique was perfect. The example illustrates exactly the growth of the ideal of persistence which is so important in the accomplishment of results that are worth while.

Another example will illustrate volitional growth from another angle. Suppose a little girl is confronted with a situation demanding a decision as to whether she shall go out to play or help her mother wash the dinner dishes. The idea of playing is pleasant, and this constitutes a strong motive for a decision in its favour. On the other

hand, the idea of washing dishes is unpleasant, and this constitutes a motive to avoid it. However, the little girl reflects that her mother has worked hard all day and will be glad to have assistance; anyway it is a daughter's duty to help her mother; she will feel more comfortable afterwards if she gives this help. So the pleasure of self-approval seems preferable to the pleasure of playing. She, therefore, chooses to forego the play, and to give the assistance which duty demands. She undergoes the disagreeable drudgery of washing dishes for the sake of the mental satisfaction that comes from the performance of duty. That little girl has grown, from the volitional standpoint, in strengthening the ideals of self-control and self-sacrifice.

Or, take the case of a boy who by accident breaks a neighbour's window. No one has seen him do it; no one is likely to associate him with the occurrence. That is the situation. What is the response? Alternative plans formulate themselves in his mind. He may go to the owner, admit the accident, and pay for the damage. The ideas of submitting to the neighbour's reproof and of parting with money that he needs for other purposes are disagreeable. On the other hand, he may say nothing about it, but he would feel uncomfortable over the sense of his cowardice. His mind balances the two courses of action, one against the other, but presently his sense of honesty compels him to adopt the first alternative. His choice is put into effect. He pays the damage and feels better afterwards. This boy, likewise, has grown volitionally in a desirable direction.

Our illustrations all point to the same conclusion. Volitional growth is conditional upon the conception of ends which are so emotionally tinged as to appear highly desirable and worth striving to attain. In other words,

character, for that is what volitional development means, depends upon the formation of worthy ideals which determine conduct. Some one has characterized an ideal as a burning idea—a very suggestive definition, embodying, as it does, the conception of an end accompanied by a keen desire for its attainment. One's choices are determined by one's ideals, and constitute the highest expression of character. The aim of volitional development should, therefore, be to establish in the child's mind worthy ideals of honesty, helpfulness, generosity, industry, persistence, self-control, self-reliance, and service, and the desire to carry them into action and conduct. The foundation of many of these may be laid early, in an incidental and informal way, and the superstructure may be built and strengthened, as the years go on, through influences that are consciously applied. The child of two or three who shows a tendency to "help mother" or to share his toys with his playmates, has the germ of the ideals of service and generosity, which under proper direction may be developed into the finest qualities of citizenship. The boy who refuses to take an unfair advantage of an opponent in a game or to copy a school exercise from his neighbour, has progressed so far in the establishment of the ideals of fair play and honesty as to make it practically certain that he will become a worthy member of society. The great purpose of education may, therefore, be stated as the inculcation of worthy ideals, with the ability, the desire, and the determination to realize them even in the face of obstacles.

If anything has been made clear from this discussion, it is that ideas, feelings, and acts of will are not three separate entities, but simultaneous conditions inextricably interwoven with one another. Intellectual, emotional, and volitional growth are not three kinds of

growth, but merely three aspects from which the same growth may be viewed. The same principles of development apply in all three phases. The proper development of one phase means equally, under ordinary conditions, the proper development of the other two. The Apostle St. Paul very eloquently summed up this philosophy of education in his Epistle to the Philippians when he said: "Finally, brethren, whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report—if there be any virtue, and if there be any praise, think on these things". Why did the Apostle advise the Philippians to "think on these things"? Because the ideas of "these things" are accompanied by lofty feelings and desires which form the motives for righteous action. In other words, if those to whom the letter was sent accepted the counsel of the writer, they would have worthy ideas tinged by worthy emotions, and completed by worthy action. And this is character—the end and purpose of all education.

PART III—THE TEACHING PROCESS

CHAPTER XI

RELATION OF TEACHING TO LEARNING

UP TO this point we have devoted ourselves largely to a discussion of the learning process. We have noted that the child learns by adapting himself to new situations through the reconstruction of former experiences. Much of this learning is incidental and informal, occurring during the ordinary and casual activities of life. Many of the most useful habits, much of the most valuable knowledge, and many of the most desirable attitudes are acquired informally, without conscious direction on the part of any outside agency.

But this informal and incidental education of the child is insufficient to fit him for the adequate discharge of his functions as a member of society. A great deal of the social inheritance—the valuable experience of former generations of humanity—could never be appropriated by the child through mere casual activities. The time must come when he has to be given experiences in a purposeful way, when he must be placed in situations which have been arranged by others, and through which he will be impelled to reconstruct his experiences and thereby learn. Teaching is nothing more than arranging situations which demand activity on the part of the child, and then assisting him in the reconstruction of his experience to meet these situations adequately. Teaching is the means by which formal education is

secured, the means by which the environment is regulated so as to give experience that is planned and purposeful. In brief, teaching is the designed arrangement of favourable conditions for effective learning. In the following chapters the teaching process will be examined.

It has already been established (Chapter VI) that the pupil enters upon his social inheritance largely through the medium of the school curriculum, which embodies those forms of experience which the race has found useful in meeting its needs. The important purpose of the curriculum is not merely to give the pupil a mental grasp of this experience in a purely theoretical way, but rather to enable him to use it in meeting the situations that confront him in real life. For instance, in the mastery of the multiplication table, the purpose is not so much to give the pupil possession of the number combinations, as to give him the power to meet his practical needs. So, too, in his study of history, the purpose is, not so much to give him a mere theoretical comprehension of the events of the past as to give him a grasp of the laws of human action in order that they may influence his future conduct as a member of society. In other words, the purpose is to give the pupil control of experience, so that it may be available as an element in his future plans of action as a social being.

In the light of our previous discussion, it will be apparent that this control of experience must be of slow and gradual growth. To the ringing of a bell, the young child a few days old responds merely by the spasmodic movement of a few muscles. He is probably unconscious of the sound; his response is purely reflex. Some months later, the same sound becomes a conscious experience, and produces more or less random movements over the muscles of the face, arms, trunk, and legs,

these movements indicating pleasure and a tendency to reach for and grasp the bell. The child has made some progress towards the control of the experience; the sound, of which at an earlier stage he was barely conscious, now means a pleasing object in the environment. Still later, he responds to the sound by appropriate movements to grasp and ring the bell, the random and useless movements having in the meantime disappeared. The bell has become for him an interesting object that he can manipulate for purposes of personal pleasure. He has gained a measure of control over the experience, but so far he is largely governed by primitive tendencies and occupied with present impressions. When he grows a little older, the sound of the bell means a visitor at the door or a call at the telephone. He responds by admitting the visitor or answering the call, or, it may be, by drawing the attention of some older member of the family to the necessity of doing so. This marks a distinct advance in the control of experience. Some years later, the sound of the bell to the same child means that the school is on fire. The idea is accompanied by a feeling of anxiety for the safety of others, and desire to be of service in the situation. This sets into operation certain habitual and volitional tendencies. He responds by quickly opening the doors of the school, assisting in the lining of the pupils to march out, guarding the younger and weaker children from injury, perhaps helping to carry out a disabled child. It is evident that the child has now achieved an effective control of many experiences, as shown by his ability to use them in formulating plans for the attainment of an important end.

It will now be evident that control of experience is reached when the child is able to set up intelligent aims,

devise plans for their attainment, and apply these plans in gaining the end desired. That is, to use terms we have previously employed, the child gains control of experience when, confronted by a difficulty, he singles out from among his old experiences those elements that seem useful in solving the problem, relates these useful elements into a satisfactory solution, and tests his solution in actual practice. In other words, education is a process of continual reorganization of experience, which gives new meaning to experience and greater ability to direct the course of subsequent experience.

The primary purpose of the school is, therefore, to give the child control of those phases of useful social experience—habits, knowledge, and attitudes—represented by the school curriculum, in order that he may the more adequately adjust himself to the changing situations in which he will continually find himself in actual life. In our discussion of the learning process in the preceding chapters, it was established that conscious control of experience is brought about in a systematic and orderly manner. When confronted by the same problems, children respond in the learning process according to definite laws. The reader will readily infer, therefore, that in transmitting the useful social experience embodied in the curriculum the school must, (1) arrange suitable situations demanding activity on the part of the pupil, that is, provide attractive problems; (2) direct the pupil in the process of reconstructing his experience in order to meet the situations or solve the problems. From the point of view of the instructor, this constitutes the *method* of the teaching process.

It is important that the student should understand what is involved in the word "method". Too often

“methods of teaching” have been regarded as abstract powers or forces existing apart from the materials to be learned. It has been erroneously assumed that teachers may have a grasp of these mysterious powers, even though they lack possession of the knowledge upon which the powers are to be exercised. In reality, method is merely a mode of procedure. It is never something existing outside of material. Method is just a way of dealing with material, a way of arranging it so that it may easily be appropriated by the learner. The futility of the attempt to make an absolute separation of “matter” from “method” in a formal lesson plan will therefore be apparent. While we may make a mental distinction between the *what* and the *how* for purposes of analysis, we must guard against the mistake of thinking that matter and method exist apart as distinguishable things.

With this caution in mind, we may proceed to a discussion of the method of the teaching process. At the outset, we should distinguish between *general* method and *special* method. Our analysis of the learning process in the preceding chapters has shown that it is governed by two general laws, (1) motivation, and (2) reconstruction of experience. It may therefore be assumed that the teaching process will be nothing more than providing suitable conditions for the operation of these laws. In other words, the laws of the learning process are equally the laws of the teaching process. General method deals, therefore, with two main questions, namely:

1. How the child is to be led to a desire to appropriate the race experience embodied in the curriculum; that is, how his activities are to be motivated.

2. How the mind of the child reacts in the presence of a problem, that is, how it proceeds to find a solution through the use of past experience.

But it is evident at once that there must be *a* method of presenting every new experience, or unit of learning, since method is merely a way of arranging material for assimilation by the pupil. This means that there must be *special* methods of teaching the individual knowledge units of the curriculum. A special method will, of course, be an application of the laws of general method to suit the particular material presented. But does this mean that there is but one correct and invariable method of teaching each knowledge unit? By no means. If that were true, teaching would be reduced to a mere formal routine with a fixed, machine-like precision in attacking everything to be taught. The fact that there are universal laws of general method does not preclude variety and flexibility in their application in particular cases. In fact, the application of these laws of learning gives ample scope for originality and initiative on the part of the teacher. It may safely be said that the efficiency of his teaching is likely to be directly proportionate to the variation and flexibility of his application of the laws of learning.

By way of caution one further word should be said regarding the question of method. There is danger that the term may be limited in application to the mere acquisition of knowledge. It must be remembered that method has to do with the whole learning process, and that, therefore, it is associated with the acquisition of habits and the acquisition of emotional and volitional attitudes as well. Method has to do with the provision of proper conditions for growth in the three fields of

habit, knowledge, and attitude. The succeeding chapters will be devoted to a discussion of the laws of general method in their application to the three phases of learning.

CHAPTER XII

TEACHING AND HABIT FORMATION

THE IMPORTANCE of habit as a phase of growth was set forth in Chapter VIII. There we discussed the manner in which the child naturally, and without conscious direction by any outside agency, obtains control of his bodily movements and establishes physical habits. It was pointed out that the processes in the establishment of these habits are as follows:

1. The child responds to a stimulus at first with a mass of purposeless, impulsive, and unco-ordinated movements.
2. Gradually the useless movements drop away, and the successful movements are perpetuated.
3. Elementary movements are combined in a great variety of forms to produce more and more complex movements, and in time, through frequent repetition of these movements, a varied store of habitual reactions is secured.

But while many serviceable habits are acquired in this informal and casual way, there are many desirable habits that must be secured in a formal and purposeful way through the teaching process. One of the most important functions of teaching is, in fact, to equip the child with a large number of useful habits, so that many invariable situations may be taken care of by habitual reactions, leaving the mind free to attend to situations that are variable. For instance, through the teaching process the child should acquire the habit of rapid recognition of words in reading, in order that his mental

effort may be devoted largely to the interpretation of what he reads. Similarly, he must establish reliable habits in writing and spelling, in order that, while writing, his mind may be concentrated on the meaning of what he writes. How wide is the field, and how extensive the opportunity for the cultivation of desirable habits through the teaching processes of the school will be evident to the reader as the discussion proceeds.

HABIT THROUGH FREE EXPRESSION

Many of these desirable habits are established through providing the child with facilities for free expression in a motor way. The school playground offers unlimited opportunity in this direction. Through the simple movements of running, jumping, hopping, and dodging, in free play, through the more complicated activities of the simpler competitive games, and through the more finely co-ordinated movements in organized games, the child gains in control of his bodily powers and in the establishment of physical habits. Similarly, through the symbolic play of the Kindergarten—the imitation of the birds and the animals and of the activities of various adult vocations—he not only develops an interest in and a sympathy with his environment, but also gains in motor control and muscular habit. Still further, through the occupational work of the Kindergarten and the expressive exercises of the primary classes—block-building, modelling in plastic materials, paper-folding and cutting, weaving, stringing, sewing, etc.—he gradually advances in motor co-ordination and in the cultivation of desirable motor habits. It will be apparent that the field for development through free expression is practically unlimited.

Two facts should be noticed in connection with the establishment of motor habits through free expression. The first is that the order of development is always from the larger and coarser co-ordinations to the smaller and finer. For instance, the co-ordinations involved in walking, running, jumping, etc., are developed earlier and more easily than those involved in sewing and writing. The teacher must, therefore, be on guard against the introduction of the child to activities which involve delicate co-ordinations before he is physically ready for them. The second fact to be noted is that motor co-ordination is of slow and gradual growth, and, therefore, the teacher must expect imperfect adjustment and crude results in the early stages of any activity, but may anticipate progressive improvement with repetition and practice.

An analysis of the process of establishing these habits will show the operation of the two laws of the teaching process to which reference has been made in the preceding chapter. The motive is the inherent tendency of the child towards physical activity, the spirit of competition, or the desire to excel. The reconstruction of experience consists in the combination of previously learned simple physical movements in new and varied forms.

HABIT THROUGH CONSCIOUS EFFORT

Concurrently with the development of motor co-ordination and physical habit through free expression comes the development of the same characteristics through conscious effort on the part of the child. This is brought about to a large extent, though not exclusively, through the teaching processes of the school. The purpose of this development is to fit the child for

social service by equipping him with certain desirable forms of skill. Examples of phases of school instruction which involve training for these skills are found in reading, writing, spelling, language, the mechanical parts of arithmetic, the operation of a typewriter, stenography, woodworking, sewing, and the activities concerned in various trades as taught in vocational schools. A few illustrations will make clear the processes involved in the establishment of habits that the individual consciously and purposefully endeavours to acquire.

Let us take first the habit of recognizing and interpreting word forms involved in reading. Almost every child has heard and enjoyed stories from the time he was able to understand. He has seen other people reading, and has noted the pleasure they obtain therefrom. He becomes convinced that, if he can only obtain the key, he may also enter this treasure house of enjoyment. He is, therefore, prepared to make an effort to acquire the art of reading which provides the "open sesame" to this world of adventure and romance. This constitutes the child's motive for undergoing the effort to learn to read, and if, during the period he is acquiring the art, the teacher can keep him constantly interested by providing material worth reading, the motive will continually be reinforced. The feeling of satisfaction that comes from each successful attempt in mastering a reading lesson will be an additional stimulus for continued effort.

During the process of acquiring the habit, the child is progressively improving his power to recognize words. He learns to distinguish quickly certain words as wholes, through first associating them with the ideas for which they stand, and then meeting them frequently in the course of reading exercises. In a similar manner, he

learns to associate certain symbols—letters and phonograms—with particular sounds, and secures ability in combining these to make words. The reading habit is established when the pupil recognizes words with a minimum of effort, and sets up such relations among them as enable him to interpret the idea intended to be conveyed. The student will recognize in this description the application of the law of the reconstruction of experience.

Similarly with writing. In his social contacts, the child has observed others expressing their thoughts on paper, writing letters, etc., and his interest in environmental activities arouses within him the ambition to participate in this ability. This motivates the effort at the outset. When the teacher places before him on the blackboard the symbol for some sound he knows, shows him how to write it, guides his hand with the chalk in making the proper movements, and then lets him try it himself, his interest in this unusual and fascinating form of physical activity stimulates him to repeated trials to make the letter. When he fails, he compares the result of his effort with the ideal form, sees where he has fallen short, and tries again. When he at length succeeds, the sense of conquest sets him at the task again and again, his technique improving with each successive trial. Other letter forms are attacked and mastered in a similar way. Letters are combined into word forms, and these into sentences and paragraphs, and presently the pupil has established the writing habit. It should be noted that in the early stages the practice work should be done in large-sized letter forms and at the blackboard. This will require the use of the large muscles of the arm more than the smaller muscles of the hand and fingers, and thus the

principle of the development of the larger before the smaller co-ordinations will be applied.

A similar procedure is followed in the establishment of language habits. Perhaps it can best be seen in the case of children who are acquiring a speaking knowledge of a language other than their mother-tongue. The novelty of using a language different from their own is itself a motive for the acquisition, and this is intensified when they observe others about them using the language. It is an activity of the environment in which they desire to participate. If the teacher is careful to present the new language in a proper way, that is, to associate the words and expressions directly with ideas familiar to the child, particularly with his activities, to use the mother-tongue as little as possible, to require accurate articulation and pronunciation at all times, and to use every available opportunity to give the child practice in the use of the language, the acquisition will be a source of increasing pleasure, which in turn will constitute a strong motive for attention and effort. On his part, the pupil observes carefully how to articulate and pronounce, tries to repeat words and expressions, notes when he fails to do this accurately, and tries again and again till success crowns his effort. In the mastery of the sounds of the new language, his ability to speak his own language will be of great assistance. The pronunciation of the strange tongue will be largely the result of his experiences with his own language combined in new ways. Moreover, as he attains greater proficiency, the conquests of tomorrow will be aided by the attainments of to-day.

In the field of vocational education, the acquisition of habits plays a most important part. In the various trades and occupations, the character of the work done is closely related to the efficiency of the workman's

habits. The carpenter who reads plans carefully, makes measurements accurately, saws to a line, planes surfaces truly, makes adjustments precisely, drives nails straight, and finishes his work nicely, is an artist in his vocation largely because he takes sufficient pride in his craftsmanship to cultivate a good technique. And, similarly, in other trades. Hence the care that is taken in vocational schools to foster the cultivation of specialized habits.

The principles of teaching that apply in the establishment of habits in the more mature students of the vocational school are precisely the same as those that apply in the cultivation of habits in the young children of the elementary school, in the fields of reading, writing, and language. The boy who learns to make a joint in electric wiring or the girl who learns to make a button-hole is actuated by a motive, a sense of the necessity of being prepared to meet a future situation demanding this ability. The process of learning follows the course already outlined in other connections. First, there is the careful examination of the finished product—the joint actually made in the wire or the button-hole actually made in the dress or coat. The use of the pliers or the needle by the demonstrator is carefully observed. The learner makes a trial, compares his work with the ideal product, observes where failure has occurred, tries again, and continues the effort till fair success has been attained. The successful accomplishment gives a sense of satisfaction which stimulates further effort, till a nearly perfect technique has been achieved.

Our illustrations are sufficient to establish the fact that the principles of teaching discussed in the last chapter apply in the development of habit. In every case we have observed (1) the presence of a motive—

the desire to meet adequately a situation either immediate or prospective, and (2) a reorganization of old elements of experience in such a way as to solve the difficulty or meet the situation satisfactorily. In the case of purely physical habits, this reorganization consists in the recombination of simple movements in more complex forms. The procedure in the establishment of the habit has already been summarized in Chapter VIII, and may again be set forth as follows, (1) the conception of the ideal result, (2) the trial, (3) a comparison of the first product with the ideal, (4) a second trial utilizing the results of the comparison, and so on, until the performance of the action is successful, (5) an attentive repetition of the action till the habit has been fixed.

It has already been intimated, though not specifically stated, that in the process of habit formation there are involved knowledge, feeling, and volitional elements. The knowledge phase consists of ideas of the end and of the means of attaining it; the feeling phase consists of the desire to attain the end and the satisfaction that attends success; the volitional phase consists of the persistence in the pursuit of the end, until success has been achieved, in spite of obstacles and discouragement.

It remains only to emphasize again the very important place that habit formation must have in any scheme of education, because of the fact that habitual reactions constitute so large a part of the life of the individual. Earlier in the chapter, several school subjects were enumerated as coming under the head of habit-forming activities, and these do not by any means exhaust the list. Reading, spelling, writing, language, which form the basic materials of the curriculum, are predominantly habit subjects; a large part of arithmetic, certain aspects of history and geography, such as the association of

important events with their dates and of place names with locations, and many phases of art, manual training, and household science, are matters of habit. A large proportion of the activities of the vocational departments of secondary schools have for their purpose the establishment of efficient habits. It is essential, therefore, that every teacher should understand clearly the application of the principles underlying habit formation, in order that desirable habits may be established in his pupils in the most efficient and economical way.

By way of further illustration of the principles involved in the formation of habits, two lessons involving the cultivation of skill are presented in outline, the first chosen from the field of primary arithmetic, and the second from the field of vocational work in the technical school. The student should analyse these lessons with a view to locating the application of the principles.

I. OUTLINE OF A LESSON ON THE COMBINATIONS OF 12 TO A PRIMARY CLASS

1. The need of the new knowledge is established by proposing a problem, such as, "John has 12 cents, and buys a work book for 5 cents. How much has he left?" or, "Bobby has 12 marbles but loses 8. How many has he left?"

2. The ability of the pupils to count twelve is tested by requiring them to take 12 steps, to rap 12 times on the table, to select 12 splints, cubes, books, etc.

3. Blocks are arranged in towers 12 inches high, each tower being made up of two blocks of different colours, for example, a five-inch block of one colour and a seven-inch block of another. In this way all the combinations of twelve are represented. A ruler might be laid over

9. A set of blocks or other material is placed on a table some distance away. Each pupil is timed, as he runs and picks up two lengths which illustrate the newly-learned number fact.

10. Flash cards with different number facts are shown, and the children give the correct answer. For example:

8	9	6	5 etc.
?	?	?	7
—	—	—	—
12	12	12	?

11. A circle is drawn on the blackboard with 12 in the centre and the numbers 3, 5, 4, 7, 6, 8, on the circumference. Then various numbers are indicated, and the pupils are required to give the other number which, along with the one pointed out, makes 12.

12. Problems such as the following are proposed: "James has \$7, and Tom has \$5. How much have both?" "Mary's mother gave her 12c.; she spent 4c. for a pencil. How much has she left?" "There were 12 oranges in a dish. The family ate 7 for breakfast. How many were left?" Etc.

II. A WESTERN UNION SHORT TIE JOINT IN ELECTRIC WIRING—TECHNICAL SCHOOL CLASS

(In this outline lesson-plan T stands for teacher, S for student.)

1. T. In wiring it is frequently necessary to connect one wire at an angle with another. How would a loosely-made joint affect the flow of the current? S. The flow would not be constant. T. You can easily imagine how this would affect the house-lighting. Since the loosely-made joint offers a resistance to the flow of the current, what condition is likely to be set up in the wire at this point? S. The wire may become highly heated. T. If

this occurred in contact with inflammable building material, what result might follow? S. It might cause a serious fire.

2. T. The need for care is so great that all light and power-wiring in this province must be done according to the Hydro-Electric code, which states that all joints must be mechanically and electrically sound before soldering. The joints must be soldered to insure preservation, and covered with insulation equal to that of the conductors. What is meant by mechanically sound? S. The joint is so firmly made that there is no tendency for it to come apart. T. When is a joint electrically secure? S. When the contact is so well made that the flow of the current is not interrupted.

T. We are going to learn how to make a joint that will meet the requirements of the code.

3. T. Here are some samples of well-made joints before soldering. Observe the condition of the wire and length of the space between the joint and the insulation on each side of the joint. Notice that the outer insulation has been cut a little farther back than the inner; estimate the length of wire required in each piece. Count the number of turns. Note how tightly and evenly the turns are made, and how they are finished off. Pull the wires to test the mechanical security of the joint.

T. You will notice that there is just a single twist between the two groups of turns. For that reason it is called a short tie joint. This type was first used by the Western Union Telegraph Company—hence the name Western Union Short Tie Joint.

4. T. These two pieces are to be prepared to make a joint. What is the first operation? S. Remove the insulation. T. Examine the insulation. Of what materials

is it composed? S. Cotton and rubber. T. They are firm, and we shall use this strong sharp knife to remove them. If we were to ring the insulation with the knife, what might happen? S. The wire might be cut. T. Why is that to be avoided? S. It would weaken the wire. T. How may the knife be used to avoid that danger? S. Cut obliquely.

T. You observe that, as the insulation is removed, the wire is supported by the first finger of the left hand—Why? S. To avoid bending the wire back and forth. T. Why should that be avoided? S. The repeated bending would weaken the wire.

T. The insulation is removed, but there is yet a thin, gummy covering. What effect would that have on the contact? S. The covering would interfere with the contact. T. We shall solder the joints later, and solder will not adhere to an unclean surface. T. Why is the back of the knife used for cleaning the surface? S. To avoid injuring the wire with the sharp edge. T. Give in detail the steps for preparing the wire.

5. T. Describe the position in which the wires are held in starting the joint. S. The cleaned parts cross at right angles about an inch from the insulation. T. How are they held in position? S. Firmly with the thumb and finger of the left hand. T. Describe how the next step was made. S. One wire was twisted part way round the second, the second part way round the first, making a short twist. T. Describe the method of securing the twist. S. Each end was given several turns round the other wire. T. Describe the turns. S. They are regular, close, and firm. T. These ends sticking up would interfere with the insulation. How shall we prevent this? S. We shall remove them with the cutters, and press the

ends in with the pliers. T. Try to pull the wires apart. Examine the joint for closeness and extent of contact.

6. T. Now each of you will make a joint up to this stage. The soldering and insulating we shall take in another lesson. Before starting the joint, tell how you will proceed.

The students are required to make joints, the teacher supervising the work and demonstrating again where failure has taken place. Each student is encouraged to compare his product with a model joint and to note imperfections. He watches the demonstrator's technique in using the pliers and tries again. This is repeated until the students have achieved a fairly successful product.

CHAPTER XIII

LESSON UNITS

IT HAS frequently been stated in these pages that the primary purpose of the school and of the teaching process is to give the pupil control of those phases of race experience which will be useful to him in adapting himself to situations which he will have later to meet. Much of this race experience consists of knowledge which has been slowly and gradually evolved by past generations of humanity, and which is deemed useful to-day for the guidance of conduct. This valuable knowledge—our social inheritance—is embodied in the school curriculum, a topic we have already discussed. We have observed that it is necessary to mark off our social inheritance into different subjects of study for the purpose of instruction. Such division is desirable, not only from the standpoint of simplicity and clearness, but also from the standpoint of efficient presentation. We need not repeat at this point the advantages of the classification of race experience as exemplified in the curriculum. The reader is advised to refer again to the discussion in Chapter VI to refresh his memory in this regard.

If a subject of study is to be efficiently presented, it must be logically arranged. Hence arises the necessity of dividing it into departments or topics that are mutually interrelated. For instance, the subject of arithmetic may, for purposes of presentation, be divided into such departments or topics as, (1) the simple rules, (2) measurements, (3) vulgar fractions, (4) decimal fractions, (5) commercial arithmetic, etc.

Similarly, grammar may be mapped out in the following topics, (1) the sentence and its parts, (2) the parts of speech, (3) classification of the parts of speech, (4) inflection, (5) syntax.

So also the history of Canada may be considered under such headings as, (1) discovery and exploration, (2) fight for domination, (3) settlement, (4) struggle for political liberty, (5) confederation, (6) social, educational, and commercial expansion.

These large departments or topics of a subject must in turn be subdivided into lesson units. A lesson unit may tentatively be defined as sufficient material to be mastered by a pupil during a single instruction period. It constitutes the solution of a problem similar to that of tying the bow knot, or making the raft, or crossing the ditch, referred to in former chapters. The teacher must analyse each topic into a series of lesson units that will cover what the pupil should know or be able to do in connection with that topic, and in the case of each lesson unit must motivate the work so that the pupil will be spurred with the desire to master the unit. For example, the topic simple addition must be divided into three sub-topics, (1) combinations of numbers, (2) extensions, (3) the "carrying" principle. The first of these will in its turn be subdivided into a large number of single lesson units, for example, the combinations of 6. And similarly with the other sub-topics. Likewise in Canadian history the single topic, "Exploration and Discovery", would be separated into several lesson units, for example, the discoveries of Cabot, Cartier, Champlain, etc.

In the analysis of a topic into lesson units, the teacher is confronted by the question—Should the topic be considered as a whole first, and its various phases taken as

lesson units later, or should the various phases be considered in order and synthesized into a whole when they are completed? In other words, should the procedure in determining lesson units be from whole to parts, or from parts to whole? The answer is that, under different circumstances, both methods of procedure are admissible, and that the better method in any particular case is determined by the nature of the topic that is being considered.

Perhaps in the majority of cases the logical procedure is from a vague idea of the whole topic to a clear and defined idea through the progressive clarification and interconnection of the sub-topics. This, it will be remembered, is the method by which the mind proceeds in the presence of a problem. The following examples of related series of lesson units will make clear to the reader this principle of arrangement.

I. TOPIC IN ARITHMETIC—COMMON FRACTIONS

Lesson Units

1. The meaning of a *fraction* as one or more of the equal parts into which a unit is divided—illustrated by means of objects or diagrams. The meaning of the terms *numerator* and *denominator*. Notation of fractions.

2. Kinds of fractions, as *proper* and *improper* fractions and *mixed numbers*. Interconversion of improper fractions and mixed numbers.

3. Conversion of fractions to equivalent fractions of different denominators, illustrated objectively. For example:

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9}, \text{ etc.} \qquad \frac{36}{48} = \frac{18}{24} = \frac{9}{12} = \frac{3}{4}.$$

4. Reduction of fractions to lowest terms.

5. Conversion of fractions to fractions of common denominator.
6. Addition of proper fractions and of mixed numbers.
7. Subtraction of fractions and of mixed numbers.
8. Multiplication of fractions.
9. Division of fractions.
10. Complex fractions; the rules of signs.

II. TOPIC IN GEOGRAPHY—WINDS

Lesson Units

1. What winds are—how caused—high pressure versus low pressure—tendency of air to flow from areas of high pressure to areas of low pressure.
2. Typical kinds of winds—trade winds—westerlies—monsoons—land and sea breezes—where these types are found.
3. Trade winds—cause—regions affected.
4. The westerlies—cause—regions affected.
5. Monsoons—cause—regions affected.
6. Effect of winds on climate, for example, (1) the trades upon Brazil, (2) the westerlies upon British Columbia, (3) the monsoons upon India.

III. TOPIC IN LITERATURE—A PLAY, A SHORT STORY, OR A NOVEL

Lesson Units

1. After a rapid preliminary reading—the main theme and the more important incidents—the characters and their relative importance.
2. The incidents of each chapter, act, or scene, and how they are interwoven. (Several units)
3. The devices by which the author has given interest and vividness to the narrative.

4. The qualities of character exhibited by the various actors in the story—how the author has suggested these qualities.

5. General appreciation of the story—gathering the various threads of the narrative together—dramatization by pupils—or writing a synopsis of the story or of incidents therein—estimate of the writer's skill as an artist—his qualities of style—selection of most striking parts of the narrative, etc. (Several units)

An examination of these series of lesson units will show that, in mapping them out, the principle of proceeding from a vague idea of the whole topic to a consideration of the various phases of the topic has been followed. It will be evident that such a procedure is adapted to give the pupil a clear idea of the relationship of the various phases to each other and to the larger topic. Thus his knowledge of details is likely to be well organized, and his idea of the larger topic clear and definite.

However, it must be confessed that there are many topics that cannot be treated in this way. There are occasions when the selection of lesson units must be made upon the principle of parts to whole. For instance, it is apparent that the subject of addition in arithmetic referred to above, must be presented first in parts—combinations, extensions, "carrying". So, too, addition of compound numbers, addition of fractions, and algebraic addition, must be taken separately, and from all these the general topic must be synthesized. Similarly, the historical topic, "Exploration of Western Canada", must be approached through its parts, in the form of the individual achievements of such men as Radisson, La Vérendrye, Fraser, Hearne, Mackenzie, Cook, Vancouver, and Thompson. Such topics, also, as the American Revolution, the migration of the United Empire

Loyalists, the Constitutional Act, the Rebellion of 1837, and the Union of 1841, which really form one historical unit, must be considered individually, and then synthesized into the larger unit with the interrelations clearly grasped. In many cases, therefore, the synthesis of the various parts must be made as the lessons proceed, and it will be well to ensure the complete organization of the elements by means of an outline review at the end of the lesson series.

Whether lesson units are selected upon the principle of whole to parts or parts to whole in reality matters little. In both forms of procedure the psychological processes of the pupil are identical. He is always learning through the reconstruction of his former experience, and the growth of his knowledge is always from the vague to the definite. So long as care is taken that the child is really obtaining organized knowledge, it is of small consequence whether the lesson units are presented according to one plan or the other.

Certain precautions should be taken by the teacher in deciding upon the particular subject-matter to be included in each lesson topic.

1. A just balance should be maintained between the difficulty of each lesson and the ability of the class. Matter that is too easy for the pupils requires no effort in its mastery, and hence is uninteresting. Matter that is too difficult discourages effort, and is, therefore, equally uninteresting. It is assumed, of course, that in all cases the teacher will see that no matter is introduced for which the pupils have not had the necessary old experience to interpret. Failure to do this will render the new matter entirely meaningless. The lesson should be sufficiently easy for the pupil to master and sufficiently difficult to require real effort to understand.

2. The amount of matter included should be carefully adjusted to the length of time for the lesson and to the attainments of the pupils. If too much is attempted, there will be insufficient time for drill and review, and, hence, there will be a lack of thoroughness. If too little is attempted, time will be wasted in needless repetition. It may be remarked in this connection that mistakes are more frequently made in presenting too little material than in presenting too much. Teachers often underestimate the abilities of pupils, and, consequently, present lessons with too little content.

3. Each unit of instruction in any subject should, in general, grow out of the preceding unit taken in that subject, and be closely connected with it. In this way, the pupil's interest is aroused for the new problem, and his knowledge becomes organized. Neglect in this regard results in the possession of disconnected and unsystematized facts.

4. Each lesson should contain one or more central facts around which the subordinate facts are grouped. This permits easy organization of the material of the lesson, and ensures its retention by the pupil. Further, the pupils are by this means trained to discriminate between the essential and the non-essential.

5. But the most important precaution to be taken by the teacher in the division of a subject into lesson units is to secure such an arrangement of subject-matter that it may be progressively appropriated by the child in harmony with his growing interests and powers of interpretation. This is what is called by some writers "psychologizing" the subject. "Psychologizing" a lesson unit requires its presentation to the child in such a way that he is stimulated to effort in the use of his past experience for the purpose of interpretation and mastery.

The psychology of a subject is, therefore, an investigation into the best methods of bringing about such reconstruction of the learner's experience as will give it meaning. The teacher must constantly seek to adjust the lesson unit to the interests, tendencies, and capacities of the pupils, in order to ensure spontaneous activity in learning. In other words, the teacher's main problem in connection with lesson units is to secure adequate motivation. Spurred by a powerful motive, the pupil will overcome prodigious difficulties in his effort to master a problem.

CHAPTER XIV

LESSON ASSIGNMENTS

THE STUDENT cannot have read thus far without being convinced that the main thing in teaching is motivation, or the provision of situations involving problems that spur the pupils to put forth effort. It may safely be said that no other gift is so valuable to the teacher as the ability to inspire pupils to conceive useful problems to be solved by themselves. If they can be supplied with stimulating motives, they will learn largely by their own effort, and the work of teaching will be relieved of much of the drudgery with which it is sometimes associated. A very important phase of the teacher's task will, therefore, consist in the study of means whereby the efforts of pupils may most effectively be motivated.

In the preceding chapter, we discussed the question of lesson units, pointing out, (1) the necessity of dividing the curriculum into a series of definite problems, and (2) the methods by which this may be done. There are two ways by which the material of these lesson units may be presented to the pupils. The first is through the actual *teaching* of the matter by the instructor, and the second is through the *assignment* of the matter to be learned, in such a way that the pupils will assimilate it through their own efforts. Much of the best work of the school is accomplished by the latter means, and the plan should, therefore, be considered carefully. It should be remarked, however, that, in setting up a distinction between the actual teaching of the lesson unit, and the assignment of it to be learned in some other

way, we do not imply that teaching is not involved in making the assignment. On the contrary, a successful assignment involves the exercise of the highest art of the teacher.

We shall deal briefly with some of the forms which assignments may take. Those most commonly used may be classified as follows:

1. Text-book assignments
2. Assignments of problems to be solved
3. Laboratory assignments, or the so-called "Dalton plan"
4. Projects to be carried out
5. Drills
6. Reviews

Each of these assignment plans will be considered in the order named.

TEXT-BOOK ASSIGNMENTS

A school text-book in any subject contains the material necessary to be learned by a pupil in the grade for which the text-book is designed. It is desirable that the pupil should read and understand the text-books, not merely because this will enable him to learn the necessary material, but also because it will lay the foundation of a habit of reading and understanding books, which will be of inestimable value in later life. Text-book assignments are, therefore, a necessary and valuable part of school work. However, there is probably no phase of teaching that is susceptible of so much abuse. To assign pupils so many pages or chapters of the book to read without any definite purpose or problem, or to require them to memorize verbatim the facts as stated in the book, are abuses of the assignment method that

should not be tolerated in any school. Practices better designed than these to kill the pupil's interest are hard to conceive.

Nevertheless, a useful form of assignment is that of particular sections of the text-book, upon the condition that the work to be accomplished is properly motivated. In general, this condition may be secured by a recall of certain past experiences which will be useful in the interpretation of the new material, and by the conception of an interesting problem. The most successful assignment is one in which the interest of the pupils is aroused to such a degree that they are ready and anxious to attack the subject. A teacher of American history once remarked to his class, "Our next lesson is about a man who has earned the contempt of every American. The less said about him the better". It is an interesting commentary upon human nature that every member of the class had carefully read the story of this man's career before the next recitation. But the incident illustrates the principle that an assignment intensely motivated always produces satisfactory results in learning.

Two other examples may be added by way of further illustration. Suppose the teacher wishes to assign for reading by the Fourth Form pupils the story of Henry Hudson as given in the text-book in Canadian History. He might first refer to the Hudson Bay railway, concerning which the pupils have some knowledge from their geography lessons and from their newspaper reading. The purposes of this railway, its advantages to Canada, and the difficulties that vessels encounter in navigating the Bay and Strait, particularly during the spring and autumn, might be recalled. Then the teacher might say, "Would you like to read the story of the first vessel manned by white men that sailed in this

great Bay? It is a tale full of adventure and splendidly told in pages 60-63 of your history text-book". It would be a dull pupil who would not be eager to read the story after such an assignment.

Or suppose the teacher wishes to assign the reading of the matter in the text-book concerning the geography of British Columbia. He might first have the pupils note on the map the position of the province and the direction of its mountain ranges. He might have them infer the direction of the prevailing winds, and the course and character of the rivers and their value for navigation. From the position of the province, the nature of the winds, and the character of the physical features, the pupils might infer the nature of the climate, the possible products, and the industries of the people. "Now we shall see whether we are right in our inferences", the teacher might say. "Let us see what the geography text-book, says about British Columbia." With such an assignment the pupils would read with intelligence and interest the material in the text-book.

In addition to the reading of the topic in the text-book, an assignment might consist of a series of questions, the answers to which would be found in the sections to be read. One obvious danger associated with this plan is that the pupils might get from their reading only a few disconnected facts, instead of organized knowledge, unless the questions are carefully planned in advance by the teacher. Occasionally, the pupils might be asked to prepare a set of questions upon the material read, and the pupil with the best list might be permitted to put them to the class. To frame a satisfactory series of questions upon a topic requires, in fact, a better organization of the materials than is required in merely answering such questions.

One of the most valuable forms of assignment is the making of a topical outline of the material read. To do this successfully requires considerable analytical ability. The pupil must be able to distinguish the essential facts, to group the subordinate facts about these, and to arrange the whole in concise form and systematic order. The pupil who can do this has carefully organized his knowledge, and has made considerable progress towards mastery of the art of reading.

ASSIGNMENTS OF PROBLEMS

The text-book assignment might also be called a problem assignment, since the solution of a problem, or series of problems, is required. But the latter is a more inclusive term, as many problems may be solved by pupils through their own investigation and effort independently of books. Interesting problems may be discovered by the pupils, or proposed by the teacher and accepted as their own, in all classes in the school.

In the Kindergarten, countless problems in stick-laying, paper-folding, modelling, building, and weaving, may be worked out. For instance, a model in paper-folding or weaving may be shown, and the pupil may be asked to analyse it and make another like it, or even to create an original form. Such problems are attractive, because they are adjusted to the child's constructive tendency.

In Primary classes, the pupils might easily learn in a vivid way the combinations of numbers, if they were given blocks, splints, or pennies, and allowed to discover the relations themselves. Similarly, in geography and nature study, they may be given little problems regarding the birds, animals, and plants of the environment, and thus acquire a fund of information, and,

still better, a desirable attitude towards nature that will probably be permanent, because attained through their own independent observation.

In higher classes, much of the material that is ordinarily taught in a formal way might better be learned by the pupils through problem assignments. For instance, pupils would have a more intelligent idea of the terms, pint, quart, gallon, peck, and bushel, if they were allowed to discover the relationships independently, by being given the measures and sent to a heap of sand or sawdust. The tables of weights, linear measure, square measure, and cubic measure, might also be learned effectively and permanently in the same experimental way. The teacher of a Third Form who borrowed the Kindergarten room where there was sufficient floor space, and then set the pupils to work with tape, chalk, and line to discover the number of square yards in a square rod, surely gave her pupils a more vivid and intelligent idea than could have been obtained from the printed table in the text-book.

Similarly, much valuable information may be obtained in most interesting ways in nature study and geography by means of the problem assignment. The nesting and feeding habits of birds, the adaptations of animals to the life they have to lead, the habitat of plants and the method of propagation, all lend themselves to independent discovery if pupils are properly motivated. The information that Whittier glorifies in *The Barefoot Boy*—

*Knowledge, never learned of schools,
Of the wild bee's morning chase,
Of the wild flowers' time and place,
Flight of fowl and habitude
Of the tenants of the wood . . .*

may be the possession of every pupil who is stimulated by well-chosen problems. So, also, useful geographical

knowledge may be secured through judicious problem assignments. A visit to a grocery store or fruit store to ascertain the various things sold and the places they come from; a visit to a cheese factory or creamery to learn the process of making cheese or butter; a visit to a lumber-mill to observe the operations in the manufacture of its various products, are typical examples of ways and means of motivating independent effort on the part of pupils. Needless to say, the knowledge obtained in this way is likely to be keenly appreciated and permanently retained.

Problem assignments are equally valuable means of motivation even in the higher classes of secondary schools. In a chemical laboratory, the pupils may be set to work to find the properties of a manufactured gas or to identify a given chemical substance; in the physical laboratory, to make a barometer or to find the specific gravity of a piece of metal; in the technical workshop, by means of callipers and rule, to centre a cylindrical piece of stock to be placed in the lathe; in the home-making department, to analyse a model French seam and to make one.

As a principle of teaching, the problem assignment is universal in its scope. It applies equally with pupils of all ages in all varieties of subjects. Adjusted to proper motives, it is capable of producing the highest results in learning and achievement. The motives to which it appeals are almost limitless—from the satisfaction of simple tendencies, like those of physical activity and curiosity, to the higher ideals, such as pride in craftsmanship and the desire to be of service to humanity. There can be no greater accomplishment in a teacher than the ability to inspire pupils to effort through the inculcation of worthy motives.

THE LABORATORY SCHOOL PLAN

One of the most discussed of recent schemes for the motivation of school work is known as the laboratory school plan or, as it is sometimes called, the Dalton plan. It originated as an experiment undertaken in the high school at Dalton, Massachusetts. In essence it is an administrative device for providing pupils with the opportunity of progressing at their own rate. It is, in the first place, an assignment plan. The amount of work to be done in a given period is designated by the teacher, and the pupils formally "contract" to complete this assignment within the period stated. It is also a laboratory plan. Pupils work out their problems in history, literature, arithmetic, geography, etc., in rooms specially equipped with all the necessary books and materials for the subject. In the geography room, for example, where the pupils work out their assignments in that subject, maps, gazetteers, atlases, and geographical apparatus are to be found. As soon as one assignment is completed to the satisfaction of the teacher, another is given. Class instruction is reduced to a minimum. The teacher, to a large extent, plays the part of individual tutor.

From the standpoint of motivation the scheme is excellent for senior pupils who have reached such a stage of development that they are able to give continuous attention to a task for an indefinite period. It stimulates research and independent work. It encourages the pupil to go as rapidly as possible. The bright pupil is not held back by the slow progress of the dull pupil. On the other hand, while the plan is advantageous to the clever pupil, it must be admitted that it involves a serious danger. It offers greater opportunity for the

lazy pupil to shirk his work than is possible in ordinary class instruction.

From the standpoint of administration the plan presents many difficulties, especially in keeping track of the various monthly assignments. Used exclusively to the complete neglect of class instruction, it reduces the functions of the teacher largely to those of assignment and examination. Without a certain amount of class instruction, it would seem difficult to prevent chaotic conditions from arising in connection with the attainments and achievements of the pupils in a class. As a scheme to be universally adopted in the schools, the Dalton plan would seem to be impracticable. Under a teacher with extraordinary gifts, with strong and commanding personality, and unusual ability in inspiring children, it might be feasible and productive of excellent results. But, under the teacher of average ability and ordinary gifts, it is to be feared that an attempt to use the plan exclusively would result unsatisfactorily.

For the purpose of supplementary class instruction, various modifications of the Dalton plan have been successfully used. For instance, in many schools both elementary and secondary, periodical "assignment sheets", containing problems for investigation and study, are given to the pupils. Sometimes the sheets indicate a minimum assignment which all pupils are expected to complete, and a supplementary assignment which those who may be able to work more rapidly may also complete. The work is often based upon the materials of the text-books, but usually includes some problems which have to be investigated through sources outside the text-books. The sets of problems are called by various names, for example, "contract assignments", "opportunity plans", etc., the names themselves being a stimulus to

activity through the suggestion that the pupil has something to gain by carrying out the work. As a means of providing profitable employment at seats for pupils in ungraded schools and of affording pupils in graded schools an opportunity to do some independent work, these modifications of the Dalton plan constitute a valuable supplement to the regular classroom instruction.

The purposes served by the Dalton method have been attained in some measure by a plan that is in almost universal use in the schools to-day, namely, that of providing pupils with varied, interesting, and profitable seat work while they are not being directly instructed. A Regulation of the Ontario Department of Education requires that the teacher's time-table shall be so arranged that each child may have at least one-and-a-half hours each day for seat work, including independent study. This Regulation was made because one of the charges brought against the elementary school was that the pupil was not trained to study independently or to work things out for himself. The ungraded rural school, and the school with at least two grades in a classroom, should not be open to this charge, for in such schools opportunity must, because of the nature of the organization, be given to classes to work by themselves. If such periods are properly directed, there should be no question of the pupil's development of habits of independent study.

It is in the case of graded schools in which there is only one class in a room that difficulty in this connection is likely to occur. Here the teacher often considers it his duty to teach his class continuously throughout the school day. Such a practice gives little opportunity to develop initiative, independence, or self-reliance. This deficiency may be removed by organizing the school in such a way that each classroom will have two different

grades, or by dividing the pupils of the same class into two sections for certain of the school subjects. While one section is being taught, the other section may be engaged in seat exercises or study. There can be no doubt that the judicious alternation of teaching lessons and study lessons will result, not only in more rapid progress in learning, but also in the development of proper habits of study.

In this connection a word should be said regarding home-work assignments. It is to be feared that sometimes unreasonable requirements are made in this regard for pupils of the elementary schools, especially in the junior classes. These pupils are at a period when vital energies are largely consumed in physical development, and, consequently, they must have time for rest and recreation. The school has no excuse for infringing upon the right of the children to sufficient time for sleep and play, or upon the right of the home to direct their activities outside of school hours. There can be no doubt that both of these rights are seriously encroached upon by the prescription of home-work ill-chosen in character and excessive in quantity. In classes below Form III, there is ample time during the school day to cover the prescribed courses satisfactorily without burdening the pupils with additional school work to be done at home. In the higher Forms, a moderate amount of home-work may reasonably be required, but it should consist mainly of supplementary reading, memory work, and review of lessons taught in school. The practice of assigning for home-work problems in arithmetic, analysis and parsing in grammar, map-drawing in geography, and written exercises in composition, should be discontinued. The school day is sufficiently long for all necessary work of this kind.

CHAPTER XV

THE PROJECT ASSIGNMENT

A MEANS of motivation that has been much discussed and widely used in recent years is the project assignment. Essentially, a project in the learning process is a problem, and, when accepted by the pupil as one demanding solution by himself, it has all the advantages of the problem assignment discussed in the last chapter. When a problem reaches a considerable degree of comprehensiveness, requires many complex activities in its solution, and demands effort over a considerable period, it is usually designated by the name of project.

Many volumes have been written about the project, and many varied and incompatible opinions have been expressed. Few writers agree as to just what characteristics mark off the project from other forms of assignment. The term was apparently first applied in connection with the teaching of agriculture, and particularly to problems assigned for home investigation, but it was soon extended to include undertakings in manual training, household science, and vocational work. The original contention was that the project must always involve effort towards some tangible achievement. The raising of a bushel of wheat, the construction of a bookshelf, the making of an apron, the baking of tea biscuits, the installation of an electric bell, are good examples of projects from this standpoint. They lead to the production of a concrete result; they may be either individual or co-operative; they may be carried to completion in a single lesson period, or they may demand continued

effort for weeks or months; they lead to the acquisition of valuable knowledge, experience, and skill.

Some writers limit the project to undertakings carried to completion in their natural setting. For instance, in their view, the baking of a batch of biscuits in the kitchen range at home for the family supper would be an excellent project for the student of cookery; but the baking of two or three biscuits from a small quantity of material in the household science room of the school would be merely a problem. The former is carried out in a natural setting; the latter is not. For the same reason, the installation of an electric bell at school for the actual use of the teacher, or at home to facilitate the announcement of visitors at the door, would be a project; but a similar installation in the physics laboratory would be merely an experiment. There is no question that the requirement of a natural setting relieves these activities of all artificiality and secures thereby much stronger motivation. However, it narrows the application of the term to comparatively few activities that are feasible in school. It is a question whether, under this limitation, many of the problems of the manual training and household science rooms or of the workshop of the vocational school could properly be called projects, since they seem to be carried out under more or less artificial conditions.

Still other writers apply the term in a very comprehensive sense. They ignore the "natural setting" requirement, and thus include many of the activities of the pupils that produce concrete results, but yet are carried on amid the rather artificial environment of the school. They include also problems the solution of which demands no tangible result in the literal sense, but rather investigation and organization. For instance, the study

of a play by Shakespeare or a novel by Scott, the investigation of the government of the city, or the organization of the historical facts regarding the exploration and settlement of Western Canada, would be a project, according to their interpretation of the term.

The views that have been stated above are sufficient to illustrate the variety of meanings that are given to the project. Amid such differences of opinion on the part of educationists, it is difficult to decide just what particular interpretation of the term should be regarded as authoritative. Perhaps the easiest way out of the difficulty is to accept the popular non-technical meaning of the word as given in the dictionary—a plan, design, or scheme—and apply it to school activities. This is practically the interpretation referred to in the preceding paragraph. Thus, any plan that the pupils decide to achieve, any design that they resolve to accomplish, any scheme that they determine to carry out, provided it has an educational value, may be regarded as a school project. This will include not only concrete achievement in the form of some tangible product such as the making of a table, but also of investigation of some question such as how the Welland Canal was built, and the organization of a large body of facts such as the circumstances leading to the establishment of responsible government in Canada. This is giving the term the widest possible meaning.

In reality the exact signification matters little, and varying views with regard to certain details are of small consequence, so long as the essential characteristics of the project are not disputed. All educationists are agreed upon two points, (1) that the project involves a strong motive and, consequently, secures enthusiastic

effort on the part of the pupils, and (2) that the pupils are engaged in *doing*, not merely *learning* something.

In the case of the table project referred to in the last paragraph, the pupils must keenly desire to make the table for a well-defined purpose; and they must make drawings, choose suitable materials, manipulate tools, construct, and finish the table. In the case of the Welland Canal project, the pupils must be interested in the question (what Ontario citizen indeed is not?); they must delve into history, consult maps, study plans, search for pictures, perhaps even visit the canal to examine it at first hand, and then organize their information in systematic form. In the case of the history project on the development of responsible government, they must conceive the problem clearly and desire its solution; they must read the history text-book, visit the library for data upon the ideals and achievements of such men as Mackenzie, Durham, Baldwin, Howe, and Elgin, consult books on civics, perhaps visit the House of Commons or Provincial Legislature to see how parliament functions, and, finally, organize their facts in a topical outline or an essay on the subject. Strong motivation and active purposeful effort to accomplish something are the outstanding characteristics of these projects.

All writers on the subject contend, or at least imply, that the project is an attempt to provide ideal conditions under which learning may take place. Perhaps the best way to observe how far the project succeeds in accomplishing this purpose is to study a few concrete examples. An analysis of these will reveal the extent to which ideal conditions for learning are supplied.

Our first example is a project that was actually carried out in a rural ungraded school. The pupils decided to make a school portfolio illustrating the history of the

local community from the time of the first settlement. The older people were besieged for information regarding the early settlers, the circumstances under which they came, their homes, their methods of clearing the farms, the first farm implements, etc. These topics were written up by individual pupils and illustrated by drawings. Pictures were gathered, illustrating the progress of the community by contrasting the early log-houses and barns with modern buildings, and the early farm implements with those now in use. The geography of the district was described and illustrated by photographs and a map showing all the farms, numbered, and accompanied by a key giving the names of all the owners, past and present. Several special articles were written on various topics. One described and illustrated the recent school fair. Another dealt with "Old Time Baking", showing pictures of an old-fashioned fireplace with its implements and utensils. As the community was interested in the raising of sheep, an article on "Wool" was written, and illustrated by pictures of the various breeds of sheep and by samples of wool in its different stages of manufacture into clothing. Several pages were devoted to live stock, showing pictures of the different types, and giving a description of their characteristics. An arrangement of cut-outs of vegetables, fruits, and grains was used to show the products of the district. A roll of former pupils who enlisted in the Great War, with a statement of their service, was prepared for the first time. The portfolio is carefully preserved in the school library, and the information it contains will doubtless be valuable and stimulating to future pupils of the school.

Our second example of a project assignment is the making of a garden in a rural school. This will include several subsidiary problems, such as the preparation of

the soil, the laying out of plots, the disposition of plots among the pupils, the sowing of the seeds, the cultivation of the plants, the harvesting of the crop. Each of these in turn involves a number of minor problems. For instance, the laying out of the plots involves calculations of measurements and considerations as to artistic arrangement; the sowing of the seeds involves decisions as to the varieties to plant and as to the relative arrangement of vegetable, flower, and grain plots; the cultivation of the plants involves questions as to the eradication of insect pests, and as to proper methods of thinning the young plants. Many other problems in arithmetic, constructive work, art, agriculture, physics, chemistry, etc., will arise in connection with the school garden project, and will be solved by observation, experiment, and inference, as the actual work goes forward.

Many illustrations of the project assignment may be drawn from geography. A class might work out the topic—"The Pulp and Paper Industry of Ontario", for example, (1) by obtaining first-hand experience through actual observation of all the operations, from the cutting of the spruce trees in the forest, through the various processes in the paper mill, to the shipment of the newsprint to its destination; (2) by studying printed matter relating to the topic, and by gathering further information by consulting books of reference in the library; (3) by collecting pictures illustrating the various operations; (4) by collecting specimens of wood, pulp, and paper at various stages in the process; (5) by mounting pictures and specimens in a geography note-book; and (6) by writing in this book, which is to be preserved for future reference, a descriptive article giving the complete story of the making of paper.

In attempting to make explicit what is implicit in these examples of the project assignment, we may note the following features:

1. In all cases, the individuals concerned were engaged in a whole-hearted way in active, purposeful pursuits or occupations. Each recognized the work as his own, and accepted full responsibility for the various activities involved in its successful completion. Each was inspired by a genuine problem based upon a real need which he felt demanded satisfaction. Hence each gladly accepted his full share of the work, (1) in analysing and defining the end to be gained, (2) in devising plans, collecting materials, determining processes that were essential, and (3) in intelligently carrying the projects through to completion.

2. The active pursuits in which the individuals engaged existed as unitary pieces of work. The project, it is true, involved many ramifications, but these were always interrelated parts of a single activity. For example, there is no formal, artificial separation of the agriculture from the arithmetic, of the composition from the nature study, in the making of the school garden. This means freedom from the artificiality and formality that are all too common in the work of many classrooms. It means, also, greater natural correlation and co-ordination among subjects of study, instead of separation into water-tight compartments with no points of contact or inter-relation.

3. In identifying himself with an active pursuit, the individual assigned himself something to *do* rather than something to *learn*. The learning which arises out of the experiences which these active pursuits brings is at once transmuted into conduct and character through the doing. In brief, knowledge-getting is not made a school

task that is isolated from active occupations, but rather is a direct outgrowth of such occupations. For example, in the first illustration the pupils did not assign themselves the task of learning the historical and geographical facts of the neighbourhood, but rather they wished to produce a creditable work that would be of use in the library and of interest to the community. Their active efforts to carry out this purpose brought, as part of its reward, a fund of organized knowledge, improved skills, and wider interests.

4. The activities involved in working out the project assignment confirm in a remarkable way the analysis of the learning process made in Chapters VII-X.

(1) The learner is confronted with a difficulty which he desires to overcome, a problem which he desires to solve, an objective which he desires to reach. Through the application of the knowledge he already possesses he defines and classifies the problem, and decides upon the materials and processes necessary to its realization. Activity is intensely motivated. In fact, so prominently does the principle of motivation operate in the project assignment that many writers have described the project simply as an effort to motivate work. From certain angles, at least, that is a perfectly legitimate viewpoint, although one must avoid the danger of putting the cart before the horse. It is the motivation that is basic, and it must be operative at the outset.

(2) The learner puts his old and assured knowledge to new uses, at least so far as he is concerned, in order to solve his problem and reach the desired objective. In other words, he reconstructs his old experience, he uses his intelligence to invent a way out of the difficulty, and thus attains the greatest of all life's joys—the joy of creativeness.

(3) The new learning results pass over into useful conduct. This transforms and enlarges his whole life. Not only does his environment take on a new and added significance, but he finds, also, that he is able to take his place in and react to the social organism in which he lives in a manner that was previously denied to him. The newly-acquired knowledge has released his capacities for further and more exacting activities. In short he has learned the truth of Tennyson's lines:

*Yet all experience is an arch wherethro'
Gleams that untravell'd world whose margin fades
For ever and for ever when I move.*

It will be evident from this discussion that the project assignment is one of the most useful means of directing the learning process. Its pre-eminent value lies largely in the intensity of the motivation that it secures, and in the vividness of the learning results that it promotes through the employment of the natural activities of the children in interesting pursuits. Not the least of its values is its contribution in the formation of such desirable moral ideals as industry, application, persistence, and co-operation.

There has been a tendency in certain quarters to proclaim the project as a new and revolutionary method of teaching. As a matter of fact, it is neither new nor revolutionary; nor can it properly be described as a particular method of teaching in distinction from other methods. It is not new, because the conception of a problem realized by the learner has for generations been regarded as fundamental in learning, and a project is nothing more than a comprehensive problem. It is not a particular method of teaching, because it simply provides what all good teaching provides, namely, favourable conditions for learning.

This is in no sense a disparagement of the project as a plan of assignment. Used judiciously, it is capable of producing excellent results from the standpoint of learning. It should be used far more extensively in schools than it is. The ingenious teacher will constantly study to invent ways of utilizing it with more and more effectiveness. But the possibility of using it as an exclusive means of ensuring the possession of the social inheritance by all children is remote. The project should be regarded as one way—perhaps the most nearly ideal of all ways—of stimulating fruitful effort in children in the acquisition of desirable habits, knowledge, and attitudes. In other words, the project is an excellent means of motivation, not a method of teaching.

CHAPTER XVI

THE DRILL ASSIGNMENT

THE IMPORTANT part that habits play in improving efficiency and the means by which they are established have been discussed in Chapters VIII and XII, and the student is advised to recall the facts set forth in these chapters before proceeding to a consideration of the next form of lesson assignment, namely, the drill. The term *drill* signifies the repeated execution of activities in a precise way until they become automatic. As a feature of school work, drill requires that certain responses which we wish to establish as habits in the pupil should be repeated in an efficient and economical way until mechanized. The number of such responses in the field of school subjects is practically unlimited. It is, therefore, essential that the teacher should clearly understand how the principles of habit are most effectively applied in the technique of the drill activities of the school.

It has been pointed out in the chapters to which reference has been made above, that some habits are formed incidentally in connection with the natural and casual activities of the child, while others are consciously formed for a specific purpose. It is with the latter class of habits that drills are particularly concerned. The skills developed in reading, writing, spelling, drawing, language, mechanical arithmetic, music, sewing, handwork, etc., in the elementary school; the skills developed in the use of foreign languages, in the handling of mathematical formulae, and in the manipulation of scientific apparatus and materials in the secondary school; the

skills developed in the operations of carpentry, machine-shop work, electrical work, and home-making of the vocational department of the technical school—all these are habits which have been consciously and purposely acquired. It is largely in this vast field of development of practical skills that the drill exercises of the school have their function.

Many of these drills, especially during the child's early school years and in connection with the introductory work in many subjects will, of necessity, be directed personally by the instructor in actual teaching lessons. For example, much of the early drill in reading and mechanical arithmetic, the preliminary exercises in French pronunciation, the first exercises in the use of the plane, will necessarily be given under the direct supervision of the teacher. On the other hand, many drills may be carried on by the pupil himself independently of the teacher's personal direction during the greater part of the time. Under such circumstances, the drill becomes an assignment, either by the teacher to the pupil, or—which is by far the better plan if it can be secured—by the pupil to himself. A great many desirable skills may be developed and improved by proper assignments.

What is meant by a proper assignment of a drill activity? The student will recall that, in former discussions, we concluded that two principles are involved in the formation of habits, namely, (1) a clear understanding of the idea, process, or activity to be mechanized, and (2) repetition with attention and self-criticism until the habit has been firmly established. The application of the former principle constitutes what we may call the *learning* phase, and the application of the latter the *practice* phase associated with the formation of the habit.

In the former, the teacher has an important function; in the latter the pupil is almost exclusively concerned.

EXAMPLES OF DRILL ASSIGNMENTS

A few examples drawn from various subjects will clarify the meaning of the two phases of the drill exercise.

Writing

Suppose the teacher wishes to teach the pupils to form the habit of making the capital *E* in the standard way. He places a model on the blackboard and asks the pupils to examine it. They report that it consists of two main parts, the upper like a capital *C* and the lower somewhat similar to the capital *O*. The two parts are joined by a small loop. The upper part is about half the length of the lower part. The two are nicely balanced and proportioned.

Then the pupils are set to work to make a few lines of *E*'s in their writing-books. This is the assignment. They are encouraged, after every attempt, to compare their form with the model, and to strive to correct faults in subsequent efforts. After a line of *E*'s has been finished, the pupils are asked to draw a stroke through the forms that are poor and a circle around the form that is best. The exercise is continued until the strokes through unsatisfactory forms become fewer. The capital may then be combined with other letters to form a word like *Erie*, *England*, etc.

Spelling

If six or eight hard words, such as *fierce*, *double*, *wagon*, *severe*, *pretty*, *starve*, *almost*, are to be learned by the pupils of a Form II class, the first stage would include the pronunciation and meaning of the words. The latter would be tested by having the words used in

sentences. In the case of each word, the difficult parts would be noted, for example the *ie* and *c* of *fierce*, and the sequence of the letters learned.

Then the pupils should be required to write the words two or three times on the blackboard or in their work-books, paying close attention to the form of each word and comparing it with the correct spelling. Other exercises should include the use of each word in an original written sentence. If the class is small, the pupils might be sent to a corner of the room and allowed to test each other's ability to spell the words, if this can be done without undue disorder.

Language

The pupils of Form III usually have some difficulty with the use of the various forms of *lie* and *lay*. By means of sentences such as:

I lie on the couch now,
I lay on the couch yesterday,
I am lying there now,
I have lain there often,

the pupils are led to say that *lie*, *lay*, *lying*, and *lain* mean *to recline*.

Similarly, by means of sentences such as:

I lay the book on the table now,
I laid it there yesterday,
I am laying it there now,
I have laid it there often,

the pupils are led to say that *lay*, *laid*, *laying* mean *to place*. The forms with the same meaning are associated and memorized together.

Next the teacher requires the pupils as an assignment, to write such exercises as the following: (1) The four

forms of *lie*, using such a model as "The dog lies under the stove now", and, similarly, the three forms of *lay*, using such a model as "The boy lays his hat on the floor now"; (2) original sentences using all the forms; (3) the proper word in sentences containing blanks, for example, "The girl has——in bed all day". In all these exercises, the pupils are advised to be sure that they are using the correct forms, by thinking of the meaning and comparing with the blackboard models. They may also be encouraged to mark each other's exercises, to hear each other read the sentences, to say the forms to themselves in original sentences, and in various other ways to secure attentive repetition of the correct forms.

The student will be able to supply many other examples, such as the learning of number combinations in arithmetic, the memorization of a poem, the use of past tenses and past participles of such difficult verbs as *rise*, *write*, *break*, the learning of the forms of the irregular French verbs, the mastery of the button-hole stitch in sewing, etc. The places for drill assignments for the purpose of improving skill are legion.

It will be noted that, in the illustrations quoted, the first paragraph deals with the learning phase necessary as a preliminary to the establishment of the habit, and the second deals with the assignment—the repetition necessary to mechanize the responses. It will be noted, further, that in this repetition care is taken to require attention through comparison with the model, through the observation of defects in the results, and through various other devices. Too much stress cannot be laid upon this feature of the assignment. Mere repetition in a mechanical way is, at least in the early stages of habit formation, worse than useless.

In the process of establishing a habit, or acquiring a skill, the pupil should, therefore, be encouraged to observe a few simple rules which lie at the basis of habit formation:

1. Learn the idea, operation, or principle which is to be made into a habit in the best and most economical way possible.

2. Let no opportunity which would necessitate the natural use of the idea, operation, or principle pass by unused. The more varied the opportunity for use, the better for the habit that is being formed.

3. Do not allow mistakes to occur during the process as far as it is humanly possible to avoid them. The fewer the mistakes, the more quickly will the habit be formed, and the stronger it will be when established.

MOTIVATION OF DRILL ASSIGNMENTS

We have still to consider one of the most important requirements of the drill assignment and the most difficult to provide, namely, the motivation of the pupil in the attentive repetition of the process until it has been habituated. How may this be secured in the field of school work? Perhaps some hint may be obtained from the "out-of-school" activities. Seemingly there is no difficulty in motivating the normal activities of actual life which are basic to habits. A boy will throw his best hat on the ground, and practise for a full hour trying to improve his skill in throwing the ball "over the plate". His father will drive twenty miles to the golf club, and practise for two hours with his mashie trying to improve his skill in approaching the green. It is much more difficult to get pupils interested in the same degree in developing skill in the use of the multiplication table. What are the conditions that are implicit in the out-of-

school pursuits that are of value to the teacher in motivating the drill assignments of the classroom? If the teacher will adopt the following suggestions, drill work will lose much of its drudgery.

1. In all probability the boy was practising for an approaching baseball game, the father for some friendly match. The suggestion is that the child in school should be made to realize the need of the work, to see its practical and social value in actual living.

2. The play spirit should be used where possible. Many of the drills in primary work may be thrown into the form of games, such as running around circles, climbing ladders and stairways without stumbling, crossing streams on stones without falling into the water, catching fish, etc. In this connection, too, a bit of friendly rivalry may at times be introduced. To be able to add or multiply faster and more accurately, or to recognize words more quickly, or to spell better than anyone else in the class, is a motive that has a legitimate place and is widely used in classrooms. Of course, the best sort of competition is competition with oneself. To wish to do better to-day than yesterday or last week, to desire to excel one's former efforts, is a motive of the highest kind.

3. The teacher should make a study of the pupil. Let him see that you are interested in his progress. Your pleasure and praise in his success, and your disappointment and sympathy in his failure, will encourage him to greater effort in accomplishment.

4. Baseball managers find that the keeping of records of batting and fielding averages is an incentive to the players. A similar plan works successfully in the school. Have the pupils in the school keep some sort of records of their achievement, such as the daily number of errors in spelling, and the words mis-spelled, the rapidity and

accuracy of their work in mechanical arithmetic, the number of perfect exercises in geography or grammar, etc. These records will prove powerful incentives in spurring the pupils on to higher levels of efficiency.

CHAPTER XVII

THE REVIEW ASSIGNMENT

THE CHARACTERISTIC feature of the drill assignment discussed in the last chapter is the repetition of an idea or operation until it has been habituated. Another form of assignment which involves the repetition of matter is the review. The term itself is self-explanatory. It means *another* view, a survey of matter from a new standpoint and in different relations. Drill is concerned with habits and skill; review with facts and knowledge. Drill involves the repetition of ideas and operations in the same way until they are mechanized; review involves repetition of facts from a different point of view for purposes of organization.

After a series of lessons on a large topic, there should be some sort of stock-taking by the learner. He should look back over the material which he has studied part by part, and organize it in such a way that the connecting links may be clearly perceived. He should see the main points of the series in their proper perspective, and grasp the unity of the whole, so that it may become part and parcel of his intellectual equipment. This organization is an excellent exercise in reflective thinking, and will enable the learner to retain the matter easily and recall it accurately.

The organization of a large unit of knowledge that has been acquired gradually bit by bit is essentially the pupil's activity, and, consequently, the review is properly an assignment to be worked out by the pupil himself. It must not consist in the memorization of the teacher's organization in the form of notes or outlines. This

memorization might possibly carry the pupil through an examination, but would add nothing to his power of original thought, which is a much more important thing. Such a procedure would be merely a matter of permitting a verbal memory to usurp the place and function of a capacity for independent thinking.

The ability to review effectively material that has been spread over many lesson periods is not one that comes to the pupil naturally or easily. He must be taught how to review. He must be shown how to make abstracts and summaries, synopses, and topical outlines. This can best be done through the regular oral teaching lessons. The teacher who systematically builds up blackboard outlines, summaries, etc., of the work, in his ordinary teaching lessons in such subjects as history, geography, and nature study, is giving effective instruction day by day in proper methods of review. In junior classes many review lessons in these subjects may also be taken orally. The teacher can in this way demonstrate the proper way to go about this type of assignment, and, with the aid of the pupils, build up satisfactory outlines and summaries. As the pupil advances in the grades of the school, he should gradually develop the power to review material on his own account, and to carry through review assignments to successful completion.

FORMS OF REVIEW ASSIGNMENTS

The principal forms which the review assignment may take have been suggested in the foregoing paragraph. It is desirable for the sake of maintaining continuous interest that there should be as great a variety of forms as possible.

Comparisons

One of the most useful assignment exercises is the comparative review. In searching for resemblances and differences in connection with two topics that have been previously studied, the pupil cannot fail to set up relations that would have escaped him otherwise. A comparison of Vancouver and Montreal as seaports, for example, will provoke keener thinking and the discovery of more subtle relationships than would be likely if each city were considered separately. For instance, such a comparison would lead the pupil to consider the countries with which the trade of the two seaports is concerned and the relative abilities of these countries to buy our products and to supply our needs; in other words, to consider the relative volumes of possible trade with European and South American countries on the one hand, and with Asiatic countries and Australia and New Zealand on the other. The periods during which the ports of Vancouver and Montreal are respectively open for navigation is another factor that must be considered. The problem is further complicated by the Panama Canal, and its bearing on the trade of each port. Still further there is the question of the relative facilities of each port to collect our products for export and to distribute imported merchandise to the people by whom it is required. Altogether, such a comparison is one calling for the most careful marshalling and examination of the facts learned in previous lessons.

The possibilities of the comparative review are unlimited, and the manifest advantages to be gained are sufficient justification for its frequent use. Geography, history, and nature study offer numberless opportunities in this direction. Canada may be compared with Argentina, New York with Chicago, La Salle with La

Vérendrye, Mackenzie with Papineau, Disraeli with Gladstone, Florence Nightingale with Edith Cavell, the tulip with the daffodil, the rabbit with the squirrel, the hawk with the owl, and so on endlessly. The comparative method may be combined with the topical outline. For instance, Ontario may be compared with Manitoba under such headings as position, size, surface features, climate, products, industries, facilities for transportation; the career of Macdonald might be compared with that of Laurier as to, (1) early education, (2) circumstances under which each entered political life, (3) career of each before attaining the premiership, (4) policy of each as prime minister, (5) important services to Canada rendered by each.

Synopses, Summaries, Etc.

To make a synopsis or summary of the material covered in several lesson periods requires discrimination and a sense of perspective on the part of the pupils. They must select the outstanding features, and group around each the more significant details. Coupled with this, there are required conciseness, clearness, and precision of expression—an excellent training in language. No better form of exercise in organization can be given. Such topics as, "The contribution of the Hudson's Bay Company in the development of Western Canada", and, "The Manufacturing Industries of Ontario" will be sufficient to suggest possibilities of review by means of the summary.

Topical Outlines

The topical outline, comprehending the materials of a large unit of knowledge, is not essentially different from the summary, except in the tabular arrangement and terse, often elliptical, statement. To make a topical

outline requires a careful analysis of the subject, to distinguish the important facts and to arrange the details in proper subordination to these and to each other. The learner who can construct a good topical outline has mastered the subject, in other words, has the materials properly organized in his mind. When prepared, such an outline is easily memorized and retained by the mind, because of its systematic arrangement, and the consequent appeal it makes to the eye.

As an example of this type of review assignment, we might take the topic, "The Development of Responsible Government in Canada", as worked out by a High School class in Canadian history. If the pupils have followed the order of the text-book, they have probably learned the subject in pieces—a bit here, another some pages later, and still another several chapters farther on. In the multiplicity of other events, they have probably missed the connections among the facts, and a topical review will be necessary to establish these. The pupils may be asked as an assignment to read all the parts in their text-books relating to responsible government, and to arrange it topically. They will thus get a grasp of the relationships among the various details, and work out an outline such as the following.

DEVELOPMENT OF RESPONSIBLE GOVERNMENT IN CANADA

I. Meaning of Responsible Government

1. Governor chooses advisers from popular assembly.
2. Under party government, this means from the party having the majority in the legislature.
3. Advisers (Cabinet or Ministry) must resign—
 - (1) If not supported by majority in Assembly.
 - (2) If defeated at a general election.

4. Thus people through elected representatives have control over Ministry.

II. Establishment of Responsible Government

1. Recommended by Lord Durham in his Report following the Rebellions of 1837-38.
2. No provision for it in Act of Union, 1841, arranged by Lord Sydenham.
3. Efforts of Robert Baldwin—the great advocate—
 - (1) Invited by Sydenham to his Council.
 - (2) Resigned when he found responsible government not intended.
 - (3) Asked by Sir Charles Bagot, 1842, to form a government.
 - (4) With LaFontaine formed the first responsible ministry in Canada.
 - (5) Conflict with Lord Metcalfe—resignation of Ministry.
 - (6) Success of Metcalfe in elections—reverse for responsible government.
 - (7) Earl of Elgin—constitutional governor—1847.
 - (8) The “Great Administration” of Baldwin and Lafontaine.
 - (9) Rebellion Losses Bill, 1849.
 - (10) Elgin’s assent in spite of popular disapproval—ministerial responsibility thus recognized.
 - (11) Burning of Parliament Buildings at Montreal.
 - (12) Principle of responsibility advocated by Baldwin recognized by Elgin.
4. Responsible government established at Confederation in provincial as well as federal arena.

III. How the Principle Works

1. Leader of political party in Commons (or Legislative Assembly) called by Governor-General (or Lieutenant-Governor) to form a Ministry.
2. Leader becomes Prime Minister.
3. Prime Minister selects men from his party to take charge of certain departments such as:
 - (1) Justice, Public Works, Railways (in Dominion).
 - (2) Education, Highways, Lands and Forests (in Province).
4. Men thus selected are recommended for approval of Governor-General (or Lieutenant-Governor).
5. Ministers must have seats in Parliament.
6. If Ministry is defeated in Parliament or general election, it resigns.
7. Leader of Opposition called by Governor-General (or Lieutenant-Governor) to form a Ministry.
8. Parliament may not last longer than five years in Dominion (four years in Province).
9. Ministry responsible for its acts—
 - (1) To the members of Parliament,
 - (2) To the people at large through the members.
10. Can be removed from office—
 - (1) By an adverse vote of the members in the House,
 - (2) By an adverse vote of the people at a general election.

MOTIVATION OF REVIEW ASSIGNMENTS

The motivation of the review assignment requires the teacher's careful study. As in the drill assignment the spirit of competition may be used effectively in junior

classes. The intense interest that motivates the old-fashioned spelling-match may be carried over into class contests in other school subjects by the resourceful teacher. When he knows that he is to test his knowledge and ability in history or geography in competition with somebody else, the pupil has a strong incentive to keep his materials organized.

The use of interesting problems requiring the review of previously learned matter provides an effective motive in many subjects. For instance, problems such as, "Which have the more numerous and more extensive glaciers, the Rockies or the Selkirks?" and, "Which side of Peru has the greater rainfall, the east or the west?" would be excellent problems to stimulate the recall and use of the pupil's knowledge of winds. A similar type of motivation may be secured through debates. Such subjects as, "Resolved that Winnipeg is likely to become a greater city than Toronto", or, "Resolved that Talon did more for Canada than Frontenac", will stimulate an eager review of the geographical or historical facts that are relevant to the question. In the same category of motives is the written examination, which, within certain limits, constitutes a powerful stimulus for the review of knowledge.

The best type of incentive to effort in the organization of knowledge is, of course, a genuine desire to trace out the relations of facts to each other just for the satisfaction of understanding them. The personality and enthusiasm of the teacher have much to do in arousing this desire in pupils. The perception of new relationships brings a real joy to the learners, and the teacher who can inspire his pupils with a zeal for intellectual conquest of this kind has performed for them an invaluable service.

CHAPTER XVIII

ILLUSTRATIVE TEACHING LESSONS

IN OUR discussion of the teaching process, as distinguished from the learning process, we have, so far, dealt mainly with the formation of habits, and with the more or less independent learning activities of pupils through lesson assignments. We have now to consider the question of the acquisition of knowledge as presented to the pupil directly by the instructor. That is, we have to analyse what is involved in the progressive development of a teaching lesson whose purpose is to build up a knowledge unit in the mind of the pupil. This subject will occupy our attention throughout several chapters.

Before beginning a systematic examination of the various phases of the teaching process, it will be well to place before the student a few examples of teaching lessons such as may be observed in schools. These examples will be submitted, not as models to be imitated by the teacher in a mechanical and unintelligent way, but rather as illustrations of the application of the laws of learning which will appear upon analysis. Reference will frequently be made to various phases of these illustrations in subsequent chapters, and the student is therefore advised to examine them with some care, in order that later discussions may be intelligible.

The following examples of the learning process will be presented in order:

1. A Study of the Rabbit with a Form II class
2. A Study of the Geographical Features of the City of Ottawa with a Form III class

3. A Study of Wordsworth's poem, *The Solitary Reaper*, with a Form IV class
4. A Study of Division of Decimals with a Form IV class
5. A Study of the Twist Drill with a Technical School Class.

STUDY OF THE ADAPTATIONS OF THE RABBIT

1. For some time before the study of the rabbit is taken in class, the pupils should have an opportunity of observing the appearance and activities of a pet rabbit in a cage. The teacher should suggest a few problems for the pupils to solve by observation, for example: Compare the hind feet of the rabbit with the front feet. Describe the teeth. Describe his upper lip. How are his eyes placed? What does he eat? How does he run? How does he show his timidity? Has he any means of protecting himself when attacked?

2. If this timid little animal is going to keep himself alive, what things must he be able to do? He must be able to (1) see well, (2) hear well, (3) run well, (4) hide easily, (5) find food when food is scarce, (6) keep himself dry in rainy weather and warm in winter, (7) make a comfortable home.

(1) How is the rabbit fitted to see well? (He has large eyes.) Where are they placed? (Well to the side of the head) What does that help him to do? (To see at the side as well as in front without turning his head.)

(2) How is the rabbit fitted to hear well? (He has long ears.) What movements can he make with them? (He can hold them straight up in front or move them about in order to catch sounds from any direction.) When running through the prickly briars or brush heaps,

how can he avoid having his ears torn? (He can lay them back along his neck.)

(3) How does the rabbit run? (He runs by leaps.) How is he fitted to do this? (His hind legs are very strong, so that he can jump a long distance.)

(4) What is the rabbit's colour? How is this colour an advantage to him? (It is much like his surroundings, and so he is not easily seen.) What is his colour in the winter? (When his coat thickens in the fall, long white hairs grow out over the brown, and make him change in colour to match the snow.) How is this an advantage to him?

(5) What does the rabbit eat during the winter? (Mainly the bark of shrubs and small trees.) How is he fitted to get this food? (He has two pairs of long chisel-like teeth in front which help him to strip off the bark easily.) How does his upper lip help him also? (It is split so that he can get close to the bark with his teeth.)

(6) Describe the fur of the rabbit. (It is made of short hairs near the skin with long hairs growing out over these.) What is the use of this thick coat of short hairs? (To keep him warm.) And of what use are the long hairs? (To shed the rain, so that he will not get "wet to the skin" when he is out in the rain.) We have already seen that in the fall the rabbit grows a new crop of white hairs which project out over his brown coat and give him a white appearance. What other use has this new coat? (Warmth in winter)

(7) Where does the rabbit make his home? (In a burrow in the earth) How is he fitted to dig in the earth? (His short front legs with strong claws are well adapted for digging, while with his hind legs he can push the earth aside as he digs.)

The teacher should refer to the economic value of the rabbit. The fur is of poor quality, and is used only for cheaper fur garments and for making felt. The flesh is used for food. The animal does little harm outside of an occasional "barking" of young orchard trees and an infrequent raid upon the lettuce and cabbage-plants in the garden.

3. At the close of the study of the rabbit, the pupils may be asked to repeat the various ways in which the rabbit is adapted to the life he has to live. An outline for a composition may be prepared by the class following the points presented in the lesson. The pupils may make drawings of the rabbit in various positions, for example, lying down, sitting upon his hind legs, running.

One of the most valuable results of the study should be a changed attitude towards this interesting little animal—a kinder treatment of pet rabbits by the children, and a desire to protect rather than to destroy wild rabbits.

A STUDY OF THE REASONS FOR THE IMPORTANCE OF THE CITY OF OTTAWA

It is proposed to make this lesson a project or a problem assignment with a subsequent discussion of the results of the pupils' inquiry and investigation.

1. The teacher refers to Ottawa as the Dominion capital, has its location and that of the neighbouring city of Hull indicated on the map, and tells the pupils the approximate population. He points out the character of the country drained by the Ottawa River and its tributaries—a wooded region with forests of pine and spruce, though these have been largely cut down in the immediate vicinity of the river. He has some of the larger tributaries traced on the map—the Gatineau,

Rideau, Madawaska, Coulonge, Mattawa. He refers to the waterfalls, especially the Chaudière in the Ottawa, the Rideau at the mouth of the Rideau, and the succession of great rapids in the Gatineau. He has the pupils note the railways radiating from the city. He shows pictures of the Parliament and departmental buildings, of the lumber and paper-mills, and of the waterfalls.

The teacher now says to the class, "I want to see if you can find out within a week why Ottawa has grown to be such an important city. I am going to give you three rather hard problems to help you in doing this. Here they are:

1. In what ways has the fact that Ottawa is the Dominion capital had an influence upon its development?
2. What factors have helped to develop its manufactures?
3. How have transportation facilities been provided and how have these affected the growth of the city?

A week from to-day we are going to discuss the things you have found out."

The reader will note that, in this assignment of the lesson, the teacher has confronted the pupils with a situation designed to arouse activity, and in doing so he has recalled to the pupils' minds many of the ideas most useful in solving the problems proposed. The reader will also note that the problems are of such a nature that the pupils will be compelled to solve them independently without assistance from the information contained in books.

On the day appointed for the discussion of the problems assigned, the pupils are asked to report their conclusions in connection with each. The ideas are carefully considered as to their value, others are suggested by questions proposed by the teacher or pupils, and all are organized in some such form as the following:

(1) Every large business organization must have a staff of officers, secretaries, clerks, and workmen. The business of the Dominion Government is largely centred in the Capital, and naturally requires the services of many people. This business is divided among several departments, each of which has many branches with its own officials, clerks, stenographers, and typists. This business staff constitutes the civil service, and comprises many thousands of members. The civil servants of Ottawa and their families form a large part of the population, and have probably contributed more than any other class to the growth of the city.

The pride of the people of the Dominion in their Capital has induced successive governments to expend large sums of money in beautifying the city. It has a picturesque situation along the towering southern bank of the Ottawa River, and its natural beauty has been enhanced by magnificent Parliament buildings, imposing departmental buildings, beautiful parks and driveways. These features attract thousands of visitors from all parts of the continent.

(2) Ottawa has three conditions which have favoured the manufacture of lumber, pulp, paper, and woodenware—(a) situation upon a large river with many tributaries draining a very large region; (b) situation within easy reach of a territory producing great quantities of pine and spruce; (c) proximity to sources of extensive water power. These conditions have combined to provide two

important possibilities: (i) logs may be floated down the Ottawa and its tributaries from the timbered areas; (ii) the waterfalls may be used to develop electric power. These two possibilities explain why Ottawa has many mills producing lumber, pulp, paper, woodenware, matches, etc. In earlier days the timbered areas were quite close to Ottawa, but gradually those near at hand have been cut over, and the timber limits have been pushed farther and farther back. Now they are so far away that many of the logs are brought in by railway, though vast numbers are still floated down the tributary rivers to the Ottawa and thence to the mills. In earlier days the water power was used to turn the machinery of the mills; now it is found to be more advantageous to turn the water power into electric power for the use of factories at some distance from the river; and Ottawa has become the centre for the development of a great volume of electric power.

Other manufactures, more or less directly connected with the lumber industry, have grown up, assisted by cheap power and the proximity of raw materials. Some of these manufactures are dressed lumber, doors and sash, furniture, street-railway cars, and cement.

Large numbers of men are engaged in the mills, and these with their families form a considerable portion of the population of the city.

(3) As Ottawa has grown in size and importance, railway lines have been built connecting it with other large centres. Several branches of the two great railway systems, the Canadian National and the Canadian Pacific (and the main line of the latter), and a branch of the New York Central, radiate in all directions from Ottawa. These railways have been justified, because of the large quantities of manufactured products that are shipped

out, and the large quantities of merchandise and raw materials that are shipped in, and because of the large passenger traffic due to the size of the city and to the fact that it is the seat of the government.

As Ottawa is a divisional point for the railways, many employees live there, and with their families add their quota to the population.

Because it is a large city and has excellent railway facilities, Ottawa has become a wholesale centre. Goods can be gathered there in large quantities, and distributed to smaller centres of population. A large wholesale trade in dry goods, clothing, boots and shoes, groceries, fruits, etc., has been built up.

A fourth topic—the history of Ottawa—might be added, if the pupils have access to a library where the information is available. As this topic throws considerable light upon the growth of the city, the main facts should be given to the class in some way, perhaps by the teacher himself.

Samuel de Champlain passed the site of the city over three hundred years ago in his historic voyages up the Ottawa River. He wrote an interesting description of the river at this point, making special reference to the waterfalls and the portage. Two hundred years after Champlain's time, the first resident, Nicholas Sparks, settled on land that is now the heart of the city. In 1827, Colonel By began for the government the construction of the Rideau Canal from Kingston to the Ottawa River. The purpose of the canal was to provide a military highway from Montreal to Kingston which would not require the use of any part of the international boundary. A hamlet grew up at the junction of the canal with the Ottawa, and was for some years called Bytown.

The development of the lumber trade brought considerable increase in population, and, in 1854, Bytown was incorporated as a city under the name of Ottawa. It is probable that Ottawa would have remained to this day only a fair-sized lumber city, had not Queen Victoria in 1858 selected it as the capital of Canada. From that time its growth in population and importance has been steady and uninterrupted.

In the outline of the topics given above, no attempt has been made to indicate the method of carrying on the discussion. It need only be said that the pupils should be encouraged to state their views freely and to ask questions upon points in which they are interested. The teacher's function will be largely that of directing the logical arrangement of the facts of the various topics.

At the close of the discussion, the pupils should be required to re-state in systematic form the various agencies by which Ottawa has been developed into a populous and important city. The best result of such a study will come through the creation of an attitude of inquiry regarding the causes and effects of certain geographical conditions. Every large city cannot, of course, be treated in this careful and detailed way, but, when a few are thus treated, the pupils will be trained to look for and discover causes for the growth and development of other large centres of population.

STUDY OF WORDSWORTH'S "THE SOLITARY REAPER"

1. The pupils should be told something of the periodical visits of Wordsworth to Scotland in company with his sister, and of the themes for poems that he sometimes found on these excursions. On one occasion while touring the Highlands, he saw a girl reaping in the fields, and

heard her singing as she worked. The song so impressed him that on his return to England he wrote the poem *The Solitary Reaper*.

(Breton's picture *The Song of the Lark*, while not depicting exactly the details of Wordsworth's poem, shows some features that would help the pupils in their interpretation, and might profitably be shown to them.)

Let us see the kind of impression left upon the poet by this Highland girl singing at her work. The pupils are directed where to find the poem in the Reader.

2. The teacher should read the poem expressively and appreciatively, the pupils following in their Readers.

(1) What does the poet describe in the first stanza? (The Highland girl singing while reaping in the fields) Of what is he speaking in the second stanza? (The sweetness of her song) Does he know what she is singing about? (No, but he makes several suggestions as to the theme.) In the last stanza what does he try to tell us? (That the song made a strong impression on him.)

(2) In the first stanza select the words that tell us that the girl had no companions in her work? (Single, solitary, by herself, alone) Why should the poet repeat this idea in so many ways? (He wants to emphasize the fact of solitude, so as to account in part for the strong effect of the song upon him.) What picture have you of the scene? (The girl in the field alone cutting the grain with a sickle, binding it in sheaves, singing as she works, unconscious of the poet's attention as he stands some distance away by the roadside.) To whom does Wordsworth address the words, "Behold her", "Stop here or gently pass!" "O listen!"? (To the reader) Why does he do this? (He wants to make the reader see the scene and hear the song in imagination. He tries to

make the reader a participant in his experience.) How does he show the strong and full quality of the girl's voice? (He says that the vale is overflowing with the sound.)

(3) In the second stanza there are several items of geography and nature study that must be cleared up before the meaning can be understood, for example, the location of Arabia and of the Hebrides; the burning deserts of the former, and the bleak winters and long-delayed springs of the latter; the characteristics of two of the most delightful song birds of England—the nightingale and the cuckoo.

To what songs does Wordsworth compare the song of the girl? (To those of the nightingale and cuckoo) Picture travellers in the desert, approaching an oasis after many hours of travel over the burning sands, and hearing the song of the nightingale. Why will it sound especially welcome to them? (It comes after very disagreeable experiences and will sound much sweeter than under ordinary conditions.) So also the sound of the cuckoo's note in the Hebrides is especially pleasing, heralding as it does the end of the long bleak winter and the arrival of the long-delayed spring. How does the poet try to make us feel the intense effect of the song? (He compares it to those of birds heard amid conditions that enhance their emotional effect.)

(4) Why does the poet ask the question at the beginning of the third stanza? Can he not hear the song distinctly? (Yes, but he does not understand it. The girl sings in the Gaelic language.) What does he suggest may be the theme of the song? (Some unhappy event in the history of her race, or some sorrowful incident which has a parallel in her own life.)

(5) Why does Wordsworth think that her song could have no ending? (It seems to come from a heart charged with great feeling.) How does the poet show that it affected him deeply at the time? (He says that he listened, motionless and still.) How does he show that the influence remained with him long afterwards? (This beautiful poem itself is evidence that the experience left a lasting impression on his mind.)

3. Select words or passages from the poem to show that the song was sad? (Melancholy, plaintive, sorrow, loss, pain.) What shows that it was full-toned? (Vale is overflowing with the sound.) How does the poet show it is charged with feeling? (Thrilling, could have no ending.)

How does he make the incident very vivid? (1) He makes the reader a participant, by the commands of the first stanza and the question in the third, (2) he uses fine comparisons in the second stanza, (3) he uses the simplest language in describing the experience.

Select lines that appeal to you because of their music. Various selections will be made by the pupils, but they should not fail to catch the fine succession of long vowels in such a line as, "Breaking the silence of the seas", and the rhythm of those splendid lines in the third stanza:

*Perhaps the plaintive numbers flow
For old, unhappy, far-off things,
And battles long ago.*

The pupils might be led to make the comparison between the theme of the last stanza of *The Solitary Reaper* and that of the last stanza of *Daffodils* by the same author. In both, the poet suggests that the pleasure of the original experience may be repeated again and again in our memory of the experience.

What qualities of the poem make it admirable? (1) The simplicity of the language, it is plain and easily understood; (2) the vividness of the description, secured by exclamations, by making the reader a spectator, by comparisons; (3) the simplicity of the theme; the poet takes a commonplace subject and gives it interest and beauty.

STUDY OF THE DIVISION OF A DECIMAL BY A DECIMAL

1. At the outset of the lesson, the following problem is proposed by the teacher: The area of the top of this table is 26.25 square feet. The width is 3.5 feet. What is the length? Pupils confess their inability to solve the problem. Why? Because they cannot divide a decimal by a decimal. That is what is to be learned in the lesson.

Thus, a situation requiring knowledge that the pupils do not possess is created in order to motivate the work.

2. (1) Review the division of a decimal by a whole number. Have the pupils analyse the process in such an example as $.0748 \div 8$. Several examples, including some requiring solution by long division, should be given, and the solutions should be written thus:

$$\begin{array}{r} 26.359 \\ \hline 9 \overline{) 237.231} \end{array} \qquad \begin{array}{r} .0075 \\ \hline 25 \overline{) .1875} \end{array} \qquad \begin{array}{r} 3.675 \\ \hline 48 \overline{) 176.400} \end{array}$$

The teacher should stress the necessity of keeping the decimal points in the dividend and the quotient in a vertical line.

(2) Two laws have to be established before the pupils can learn to divide a decimal by a decimal:

(a) To multiply a decimal by 10, 100, 1000, etc., we move the decimal point one, two, three, etc., places to the right.

(b) Multiplying the dividend and the divisor by the same number does not change the quotient. (The pupils may already be familiar with this rule from their previous work in cancellation and in the conversion of fractions to equivalent fractions with different denominators.)

To establish the first law, have the pupils multiply several decimals by 10, and observe the results, for example:

$$.12 \times 10 = 1.20 = 1.2; \quad 32.4 \times 10 = 324.0 = 324.$$

$$.023 \times 10 = .230 = .23; \quad .00017 \times 10 = .00170 = .0017$$

From these results they infer that, to multiply a decimal by 10, we move the point one place to the right.

Similarly, the pupils multiply several decimals by 100, and observe the results. The pupils infer that, to multiply by 100, we move the decimal point two places to the right.

In the same way, we establish the rule for multiplying a decimal by 1,000, 10,000, 100,000, etc.

Now ask such questions as: How do you multiply a decimal by 10? By 1,000? By 1,000,000? etc. By what do you multiply, when you move the decimal point two places to the right? Three places? Five places? etc.

Multiply orally .002375 by 10, 1,000, 100, 10,000, etc.

To establish the second rule, take such an example as $12 \div 3 = 4$. By having the pupils multiply the dividend and the divisor by the same number in successive trials, we get a series of results that may be arranged thus:

$$12 \div 3 = 4$$

$$24 \div 6 = 4 \text{ (Multiplying by 2)}$$

$$36 \div 9 = 4 \text{ (Multiplying by 3)}$$

$$60 \div 15 = 4 \text{ (Multiplying by 5)}$$

$$108 \div 27 = 4 \text{ (Multiplying by 9)}$$

$$288 \div 72 = 4 \text{ (Multiplying by 24)}$$

From observation of these examples, the pupils infer the rule that multiplying the dividend and the divisor by the same number does not change the quotient.

3. We shall apply the two rules that we learned a moment ago in the division of one decimal by another. Suppose we have this example:

$$.0234 \div .6.$$

How shall we convert the divisor .6 into a whole number? (Multiply by 10.) If we multiply the divisor by 10, by what must we multiply the dividend so that the quotient will remain unchanged? (By 10.) Multiply both the dividend and the divisor by 10, and state the results.

$$\begin{array}{rcl} & .0234 \div .6 & \\ = & .234 \div 6 & \begin{array}{r} .039 \\ \hline 6) .234. \end{array} \\ = & .039 & \end{array}$$

Similarly, analyse an example like $.00288 \div .08$.

$$\begin{array}{rcl} & .00288 \div .08 & \\ = & .288 \div 8 & \text{(Multiplying dividend and divisor} \\ = & .036 & \text{by 100)} \\ & \begin{array}{r} .036 \\ \hline 8) .288. \end{array} & \end{array}$$

So also $23.71 \div .025$

$$\begin{array}{rcl} = & 23710 \div 25 & \text{(Multiplying by 1,000)} \\ = & 948.4 & \begin{array}{r} 948.4 \\ \hline 25) 23710.0 \end{array} \end{array}$$

After several problems have been solved in this way, have the pupils state the method of dividing one decimal by another in some such way as the following: Move the decimal points in both the dividend and divisor as many places to the right as will make the divisor a whole number, and then proceed as in ordinary division.

4. The pupils will now be in a position to solve the problem which they were unable to deal with at the beginning of the lesson. This problem may be followed by others of a similar type.

STUDY OF THE TAPER-SHANK TWIST DRILL IN A MACHINE-SHOP CLASS OF A TECHNICAL SCHOOL

*(In the following outline lesson plan T stands for teacher;
S for student.)*

1. The student is making a machinist's hammer as a project. He wishes to drill the head preparatory to sweating in the handle.

T. Before drilling the head, we shall study the tool with which the drilling is done, so that you may better understand how it works. You will find drills on several desks. Examine one carefully.

2. T. From what shape stock was the drill made?
S. Round stock. T. That deep groove is now cut in the stock. Drills were formerly twisted out of a flat piece; hence the name twist drill. With a file, test the hardness of this broken drill. What do you find? S. It is very hard. T. The drills are made from carbon steel or high speed steel. You will learn more about those later.

(1) T. How many parts are there to the drill?
S. There are three chief parts—the part for holding in the machine, the part with the deep groove, and the cutting edges. T. These are the *shank*, *body*, and *lips*, respectively.

(2) T. The shank consists of two parts—the shank proper, and the smaller part, the *tang*. This socket holds the drill when it is being used. Examine the socket to see how it accommodates the shank. What do you notice?
S. The tang fits into a small slot in the end, and the taper

of the shank into the tapered opening in the socket. These hold and drive the drill.

(3) T. Compare the circumference of the body at the lips and at the shank. What do you observe? S. There is a slight taper from the lips towards the shank. T. What is the purpose of this taper? S. To provide body clearance. T. Describe the groove or flute in the body. S. It begins at the lips, and passes spirally up around the body, and ends a little below the shank. T. Compare the front and the back surfaces of the flute. S. The curve of the back surface is shorter than the curve of the front surface. T. What purpose is served by a flute of this shape? S. To provide body clearance also. T. The curved surface of the body between the turns of the flute is called a *land*. The remaining part of the body is called the *web*. Where is the web thickest? S. Between the end of the flute and the shank. T. Why? S. To give the drill strength at a point of strain.

(4) T. How is the point of the drill made? S. By cutting back the lips from the central axis. T. Compare the lips as to length. Use your scale and measure accurately. S. They are exactly the same length. T. What would result if one lip were longer than the other? S. The longer lip would determine the diameter of the hole. T. By means of a gauge measure the angle that each lip makes with the long axis of the drill. What do you observe? S. The angles are the same—59 degrees. T. Why should the lips be cut back at an angle? S. To allow clearance when cutting. T. Why should the angle be the same for each lip? S. The flatter lip would do all the cutting. T. There would be a tendency also for the drill to split along the central axis. 59 degrees has been found a satisfactory angle at which to grind the twist drill.

3. T. Why is this type called taper-shank twist drill? Of what material is it made? Name the parts of the drill. Tell how each part is related to the operation of drilling. Describe in detail the fluting. What provision is made in the drill for clearance? What care must be exercised in grinding the drill? By what mechanical device is the drill secured in the lathe? How is drive obtained?

CHAPTER XIX

MOTIVATION IN THE TEACHING PROCESS

IN DEALING with the growth of habit, knowledge, and attitudes in several preceding chapters, the term *motivation* has been frequently used, and the reader is already familiar with its general significance as a means of awakening mental activity and arousing spontaneous effort. In the various phases of the learning process we have emphasized its importance, and in the teaching activities, so far as they have already been considered, we have pointed out its universal use. The following story of an actual occurrence will further illustrate the principle.

A small boy of four had developed a strong attachment for his grandfather, who lived in a distant town. The forced separation, except at rare intervals, interfered with the full and free expression of their mutual regard. At length, the boy, through observation of the behaviour of maturer associates, conceived a plan to overcome the difficulty. He decided to write to his grandfather, in the hope that his grandfather in turn would write to him. But here was a situation that could not successfully be met without a mastery of those modes of adult response known as reading and writing.

The story of the first letter to the grandfather is enlightening. With paper and pencil in hand and an old primer open at the printed alphabet, the boy entered upon the supreme task of his life. The words, "Dear Grandfather", were uttered in an audible whisper. Then came a cry—a universal cry, by the way—the

cry of immaturity to maturity for guidance and assistance in the hour of need. "Mother", said he, "how do you spell *dear*"? The mother spelled it for him. He repeated it many times. Then came the next cry for help. "Mother, where is *D*?" The mother pointed to *D*. With consummate care and infinite patience he traced and re-traced the letter and finally transferred it to paper. Then a cry for further help. "Mother, where is *E*?" Here it should be noted in passing, is an example of the proper place of questioning—by the child himself, when he finds himself in a situation where he feels so keenly the need of the information to solve his difficulty that he goes for it to an authoritative source. Thus the boy's demands for assistance, the patient guidance of the mother, and the supreme efforts of the boy continued, until the prodigious task was completed, and the letter was despatched to the grandfather. In a few days the impatiently-awaited reply arrived. What a challenge! What patience and persistence and toil it required to spell it out! And what happiness it brought when it was finally conquered and read!

In an incredibly short time the boy had mastered the arts of reading and writing, and was able, with but little assistance, to put them to the use designed by the race—the communication of ideas. And thus was acquired what has been to many the most abject drudgery—a mastery over the most useful skills that a human being acquires.

The driving force which impelled this small boy to learn to read and write is a typical example of the influences which determine effort in whatever sphere it is found. He found himself in a situation demanding action. A keen desire to communicate with his grandfather, with no means immediately available for the

purpose, prompted a plan to attain the end—a plan that was carried into execution with intense earnestness. That is, the boy had a motive for activity. As one looks around upon the activities of the world, one must be impressed with the universality of motive as the impelling force of human action. The bricklayer studies the qualities of certain building materials, tries to acquire skill in the use of his tools to obtain certain results, and adopts the best methods of construction that he can learn from others or discover himself. Why? Because thereby he may be able to satisfy his sense of craftsmanship, his desire to promote the comfort of others, and his need to earn a living for himself and his family. In other words, he has needs to satisfy, purposes to fulfil, ends to attain, motives for effort. The missionary in the foreign field, inspired by Christian zeal, undergoes untold drudgery and sacrifice in learning a native language, in order that he may speak in their own tongue to the people to whom he is to minister, and thereby influence them more effectively. Similarly, the teacher studies the theory and art of education, observes the characteristics of his pupils, prepares in advance the material he has to present, and works energetically in the classroom because he is impelled by some motive. This may be, as in the case of the bricklayer, the desire to satisfy his sense of craftsmanship or to earn his living; it may be the desire to prepare his pupils for promotion examinations or to establish a reputation for efficiency in teaching; or, best of all, it may be the desire to develop in his pupils desirable skills, knowledge, attitudes, and ideals.

What is true of adults is equally true of children; their effort is conditioned by motives or purposes often immediately realized, or by needs more or less consciously

felt. In the case of very young children, the needs that are satisfied are of necessity very vaguely realized if at all. For instance, the child engaged in building towers or houses with his blocks is in reality satisfying such urgent tendencies as those of physical activity and constructiveness. To say that he is conscious of the need of satisfying these tendencies would, of course, be untrue, but, nevertheless, he probably realizes in a vague way that the activity gives him pleasure.

The question naturally arises whether the activities of the school-room are conditioned by motives in the same way as are the activities of actual life outside the school. In other words, can the teacher in the school use this principle of motivation in securing effort on the part of the pupils in the learning process? Can school lessons be motivated in the same way as was the effort of the small boy who wished to write to his grandfather? For many years educationists have been emphasizing the necessity of motives as a means of directing the activities of children in the school-room. They have pointed out that one of the teacher's main functions is to awaken the right kind of motives, to confront children with situations involving difficulties to be overcome, in order to secure real effort in the learning process.

It is probable that, in most cases of learning and in all cases of purposeful thinking, an idea of a situation to be met, or a difficulty to be overcome, will be found as an essential condition. If this is true, the question that suggests itself is, "Shall the teacher try, at the outset of the lesson, to place the pupils in a situation to which they feel they must adjust themselves, or shall he try to lead the pupils blindly forward to some goal that he has in his own mind? The question may be more clearly stated by means of illustrations.

In the paper-folding and cardboard-modelling exercises in constructive work in primary classes, there are two possible modes of procedure. The teacher may, on the one hand, give exact directions as to the folds, measurements, and cuttings that are to be made, keeping the pupils in the dark as to the object of the construction. On the other hand, he may allow the pupils to examine the model at the outset, and to make suggestions as to how it is to be constructed. Which is the better method for the teacher to follow? Obviously the latter, for the pupils have, from the beginning, a motive to direct their activity—the desire to make a model like that before them. By means of the latter plan, initiative is encouraged, judgment is called into play, methods of attack such as are used in practical life are demanded, and the constructive and creative tendencies are stimulated. It is not to be supposed, however, that there is no motive in the minds of the pupils in the former case. They like to be manually employed; they may be carried forward by a question in their own minds such as, “What is this model going to be?” or they may be spurred on by the desire to please the teacher or avoid punishment.

The motives that stimulate activity differ in individual children, and vary with changing circumstances. In primary arithmetic, the learning process may be motivated by the pupil's desire to know the number facts, by his curiosity as to what the teacher is going to let him do with the blocks or other concrete material, or by the wish to gain approbation or to stand well in the class. In primary reading, the effort of the pupil in the recognition and pronunciation of new words may be determined by the conviction that an interesting story is to be found as a result of the effort, or it may

be determined by the desire to impress his father and mother with his growing attainments. In the study of history, the boy may be stimulated, on the one hand, by a real desire to know the achievements of a great man or to trace out the causes of certain results, or, on the other hand, by the hope of passing a distant examination or of avoiding a penalty threatened by his teacher.

From these examples it will be recognized that motives are of two varieties. There are, first, those which are directly associated with the matter to be learned. In such cases, the acquisition of the facts or the performance of the activities is itself the fulfilment of the end. There are, on the other hand, motives which are only indirectly associated with the matter to be learned. In such cases, the acquisition of the facts or the performance of the activities is only a means of achieving the end. The former motives may be described as *direct*; the latter *indirect*. The child who puts forth effort because of the inherent attractiveness of the material learned or the activity performed has a direct motive. The child who puts forth effort because the material or the activity is connected with a further end which is to him desirable, for example, to secure approbation, to avoid penalty, or to pass an examination, has an indirect motive.

The direct motive, is, in general, the more satisfactory, since it is likely to promote activity more intensely and more continuously. However, indirect motives are often of a desirable kind and are often useful in promoting activity. Examples of these will be found in the illustrations of the carpenter, the missionary, and the teacher, given in a former paragraph. They are often valuable in the case of young children, whose early efforts in

learning must be stimulated frequently by ends more or less unrelated to the material to be learned. To obtain the teacher's approval, to stand high in the class, to secure promotion, to excel others, are ends which justly have a place in securing effort from young children. Moreover, motives are seldom unmixed. The teacher-in-training, for instance, while solving problems of method of inherent interest in the lecture room, has at the same time a judicious eye on the final examination, and on the probable value of the discussion in the solution of future problems in his own classroom.

As a matter of fact, the distinction between direct and indirect motives is not so important as the distinction between indirect motives of the better and of the worse kind. The contrast between the motive of the missionary in learning a native language in order that he may teach the people, and the motive of the man who solves a newspaper puzzle to win a prize, or the motive of a child who learns a lesson to avoid punishment, is great indeed. In the former case there is an inherent relation between the effort and the end; in the latter cases the relation is purely external. Indirect motives are of all gradations of goodness, from those that are excellent and highly laudable to those that are positively bad. The student will be able to supply examples and estimate their value. The teacher in the classroom will do well to examine the motives that are directing the effort of his pupils, and endeavour to supplant those that are questionable by others of higher order.

It is doubtful if the indirect motive is of itself sufficient to sustain effort for any extended period. The child cannot be continuously active in arithmetic with no other motive than that of securing approbation. In the learning of history or chemistry, the thought of the

distant examination is not enough to secure continuous effort on the part of the student. Sooner or later the learner must become interested in the material or the activity for itself, if progress is to be secured. The indirect motive is useful to initiate effort, to start the pupil off in the required direction, and to bring back the wandering mind to the task again and again. Fortunately, this is usually enough to reveal points of interest in the material or the activity, and the indirect motive, for the time being, disappears from view. In any event, the best and most rapid progress can be secured only as a direct motive replaces the indirect, and becomes dominant in determining effort.

From the discussion up to this point, it will be apparent that all effort is impelled by a motive of some sort. We may assume, therefore, that the mastery of the social inheritance represented by the materials and activities of the school is directed by motive. This may be provided by the teacher, through creating situations, and thereby awakening needs and inspiring aims which the pupils realize as their own. When the teacher, at the beginning of school lessons, places the pupils in a situation to which they feel the necessity of adjusting themselves, he has gone a long way towards securing intellectual activity and effort on their part.

CHAPTER XX

ADJUSTMENT OF SCHOOL LESSONS TO TENDENCIES AND CAPACITIES

IN THE preceding chapter it has been established that successful teaching depends in the first instance upon confronting the child with situations to which he feels the need of adjusting himself. The question now arises as to how and where these stimulating situations are to be found. In Chapter II we showed that the child's growth depends upon the interaction of his native and acquired tendencies with the environment. Through his tendencies he is constantly reaching out towards and seeking contact with his environment, and the environment in turn is constantly appealing to his senses and presenting problems to his intelligence. The interplay between tendencies and environment is the essential condition of mental growth. This fundamental principle should determine the presentation to the pupil of the materials of the course of study. From this standpoint, the teacher's function may be stated as the arrangement of the environment in such a way as will make the most effective appeal to the tendencies of the child. In other words, the teacher must constantly strive to place the child in intellectual situations which involve problems which he feels the necessity of solving.

It has already been said in another connection that no other accomplishment is so useful to the teacher as the ability to inspire his pupils to conceive useful problems which they desire to solve by themselves. His task in this regard is difficult, and requires careful study of the material to be learned and of the characteristics

of the pupils. If, however, he has a thorough grasp of the knowledge to be imparted, and at the same time knows the tendencies, interests, and attainments of the children, he should seldom be at a loss to inspire them with useful aims and purposes. Successful presentation of school lessons may be secured only through their proper adjustment to the tendencies and the capacities of the pupils. This statement will be made clear by a consideration of the methods by which this adjustment to certain typical tendencies and capacities may be secured.

PHYSICAL ACTIVITY

The restless physical activity of the young child is a characteristic which has important educational implications. He enjoys physical activity for the sake of the activity itself. This is true of his earliest acts, such as the random movements of his arms and legs, stretching, smiling, etc. Through these impulsive movements, performed without conscious purpose, the child forms ideas of different acts and associates these with other ideas. As he grows older, because of the close association between ideas and action he takes a keen interest in knowledge that comes to him in direct association with motor activity. His early knowledge of the objects in his environment is obtained through what he can do with them. He learns their qualities by handling, biting, striking, rolling, throwing, opening, and breaking them. As soon as he discovers the purpose of an object, for example, to sweep with a broom, to cut with a knife, to pound with a hammer, or to mark with a pencil, he becomes engrossed in its use to the exclusion of its other qualities.

For these reasons, the teacher should, wherever possible, present the school lessons in association with some form of physical activity. This activity should not be regarded as a diversion or as a relief from more serious pursuits, but rather as a means of fundamental value in gaining knowledge. In this way the artificial gap which too often exists between the school and real life will be bridged, and school work will be a pleasurable occupation instead of a disagreeable task. Knowledge getting is inseparably associated with physical activities directed by a purpose.

Illustrations of this principle in its application to the work of the school are easily found. The exercises of the Kindergarten afford unlimited opportunities in this direction. In primary arithmetic the pupils can best be taught the number combinations through the use of blocks, splints, pennies, and other objective materials. In higher classes the pupils may discover for themselves the relationships among different units of measurement. For instance, such problems as the number of feet in a yard, yards in a rod, pints in a quart, quarts in a gallon, etc., can be solved in the most interesting way by having the pupils make the actual measurements, and thus establish the relationships. There can be no doubt that the science work of the high schools is made much more attractive by the modern practice of permitting the pupils to arrange apparatus and carry out experiments themselves in the laboratory.

CONSTRUCTION

The constructive tendency is a special phase of the general tendency to physical activity. The child's delight in motor expression develops into a desire to make things. He finds keen satisfaction in building towers

and houses with his blocks, in making trains and street-cars out of chairs, in constructing bridges, cranes, and windmills out of his mechanical toys. Whenever the teacher employs this constructive tendency in the work of the school, he is using one of childhood's strongest incentives to work. Some of the most valuable exercises of the Kindergarten and primary classes are to be found in paper-folding, stick-laying, weaving, and plasticine-modelling. From these occupations, pupils learn a great deal regarding colour, form, and numbers. In the geography lessons of the Second Book classes, elementary ideas of land and water forms can be secured by means of constructive exercises at the sand-table. In the arithmetic work of the Third Book classes, the relationship among the units of square measure may vividly be established by having a square foot and a square yard drawn by the pupils on the blackboard, and divided into square inches and square feet respectively. The most effective way to teach that there are $30\frac{1}{4}$ square yards in a square rod is to have the pupils with a tape-line lay out a square rod on the school floor or playground, and actually show the 25 square yards, the 10 half-square yards, and the quarter-square yard. Similarly, the pupils who build rectangular piles of inch blocks will learn by examination the method of finding volumes in a much more impressive way than they would by many repetitions of the rule given them by the teacher. So too, the early work in fractions may be presented in a really vital way through paper-folding and cutting; the fundamental conceptions of geometry through cutting triangles out of cardboard, measuring angles, and establishing relations among them; the simpler phases of agriculture through planning and making a school garden; the principles of motor mechanics through

the building and operation of machines. In all these operations the teacher has a powerful ally in the pupil's tendency to construction in the establishment of interest in the work of the school.

There are two dangers which the teacher must guard against in the use of the pupil's constructive tendency as a means of adjustment to a situation. The first is that the pupil, in his interest in making things, may fail to grasp the meaning of what he is doing. For instance, in the sand-table exercises in geography, the mere moulding of the forms may be so interesting that he fails to see their significance as representations of features of the earth's surface. A teacher once discovered this when, in an attempt to give a vivid impression of a volcano, he distributed bits of absorbent cotton each containing a small amount of gunpowder. He asked the pupils to place these in the summits of the hills they had made on the sand-table, and to touch them off with a lighted match. For several days thereafter the pupils clamoured to be allowed to have the "fireworks" again. This example illustrates the necessity of requiring pupils to look beyond the representation, and to grasp the truth which it illustrates.

The second danger, which has been suggested in another connection, lies in the possibility of exacting too great manual skill in the things constructed by the pupil. It should be remembered that, especially in his early years, he has very imperfect muscular control, and that therefore his constructive technique is necessarily imperfect. The teacher should, on this account, be satisfied with more or less crude results in the early stages, but may with confidence expect progressive improvement as the pupil gains in motor control and co-ordination.

CURIOSITY

Curiosity is the inquisitive attitude of the mind which causes the individual to seek out what is strange in his surroundings and make it an object of attention. The significance of this inquisitive attitude lies in the fact that it leads the child to interpret the world about him. Lacking curiosity, he would never discover either the benefits to be derived from or the dangers to be avoided in his environment. In addition to its practical value in leading him to study his surroundings in order to meet his actual needs, curiosity often seeks a more theoretical end, appearing merely as a feeling of wonder or a thirst for knowledge. This explains why the child asks such ceaseless and varied questions about the world around him. His persistent "What?", "How?", "Where?", and "Why?", with regard to everything that comes to his notice, indicate his general attitude of inquiry towards his environment. The parent or teacher with wise insight will return patient and ungrudging answers to these incessant questions, and thus encourage and not inhibit one of the child's most useful tendencies from the educational point of view.

This appetite for knowledge regarding what is new and strange is perhaps the strongest ally of the teacher in securing interest in school activities. It constitutes a very frequent motive for effort in learning. The teacher appeals to the curiosity of the pupil in many school activities involving the acquisition of knowledge. It determines the effort of the pupil when he seeks information on his own account through reading, or observation, or experiment. In primary arithmetic the question in the pupil's mind may be, "What is the teacher going to let me do with these objects?", or, "What game are we going to play with these numbers?".

In history the question may be, "What did this man do for the good of his country?", or, "What causes produced these unusual results?". In geography it may be, "What sort of life do these far-away people live?", or, "What results have these conditions produced?", or, as in the case of the study of Ottawa, "How did this city grow to be so large?". In literature it may be, as in the case of the study of *The Solitary Reaper*, "What sort of story has this writer told?", or, "What means has he taken to make his story interesting?". In nature study and science an endless series of interesting difficulties arise in connection with the animals, plants, and natural phenomena of the environment. For instance, in the study of the rabbit the pupil can scarcely fail to conceive the problem, "How can this timid animal elude his enemies?".

As in the case of the constructive tendency, curiosity must be directed upon the real difficulty in the situation, and not wasted upon trivial and accidental features that may accompany it as mere side issues.

COMPETITION

Competition, if it is judiciously directed and is not used to the extent of creating ill-feeling among pupils, is a useful method of motivating effort. The desire of a child to read and spell better than others in the class, to add and multiply faster and more accurately, to write more interesting compositions, to sew more neatly, to make a finer model in cardboard or wood, or to stand higher in the class on the monthly tests, is a powerful stimulus to hard work, and has a legitimate, in fact inevitable, place in every classroom. The little contests that are conducted in junior classes in connection with drill exercises in primary reading and arithmetic, such

as climbing ladders or stairs and running around circles, involve this competitive tendency. It is to be acknowledged that competition with oneself is a more desirable motive than competition with others. To surpass one's record of the day before in some phase of school activity is an ideal that ought to be held before every child as worth striving to attain.

ACQUIRED INTERESTS

Children have a multitude of acquired interests outside, as well as inside, the range of school activities. They have interests in the people, animals, plants, machines, and tools of their environment, in the occupations of the neighbourhood, in the activities associated with the particular seasons and holidays, in the games they play, in the books they read. One of the fortunate characteristics of interests is their tendency to widen and become operative in new fields related to those in which they were originally active. The child grows largely because of the widening of his interests. For instance, from an interest in the animals of the farm, he may develop an interest in reading about animals, and later an interest in reading in general. His interest in tales of brave deeds and of pioneer life may become the basis of an interest in history. The interests associated with the school garden may include an interest in problems of measurement, and become extended to the whole subject of arithmetic. The universal interest in stories will involve an interest in narrative poems, which may be widened to include poetry in general.

This principle of the widening of interests, through the inclusion of related fields within their scope, is most important in the development of learning situations.

If the teacher, in approaching new problems, can associate with them the child's active interests, he may be certain of genuine effort in their solution. For instance, the teacher who is about to present Henry Van Dyke's poem, *Hide and Seek*, to a class of Third Book pupils, might first inquire if they know how to play this game. The rules of the game would be described by the pupils. Then the teacher might recall to their minds the pathetic little story of the hide-and-seek game as played by the little boy and the old lady in the poem, *One, Two, Three*, in the Second Reader, which the pupils have already read. The teacher might then say, "Now here is a poem on page 72 of your Reader in which we have another story of a game of hide-and-seek. We are going to study it." The pupil's interest in a familiar game is associated with the story told in the poem. Again, in teaching to a Second Book class the story of John Cabot's voyages to America, the teacher might begin by asking the pupils if they had ever gone for a boat trip, say from Toronto to Niagara. How long did it take them to go? In what kind of boat did they go? What kind of boats take people across the Atlantic Ocean now? How long does it take to go across? (Show pictures of ocean-going ships.) In what other way have people crossed the Ocean? (Aeroplanes) How long does it require to go in that way? Now you are going to hear the story of a man who crossed the Atlantic Ocean long, long ago in a little ship like this (show picture), and who spent fifty-two days in crossing. In some such way as this the present interests of the pupils might be utilized in gaining an interest in the story.

PRESENT KNOWLEDGE

As the child advances in the acquisition of knowledge or experience, his desire for mental activity increases. He takes delight in the use of any knowledge over which he has adequate control. It has already been shown that he adjusts himself to new situations only by bringing to bear upon them ideas from past experience which appear to have some relevancy. It is evident, therefore, that the situation with which he is confronted should involve difficulties which have a close relation to his past experience, and which he can solve by the use of knowledge over which he has already complete mastery. Thus he develops an interest in the difficulty which requires solution. On the other hand, if situations are presented involving intellectual difficulties, the solution of which requires the use of ideas over which he has inadequate control, his interest will be greatly reduced.

For this reason, the teacher must be careful to place the pupil in learning situations that are suitable to his present attainments. Any difficulty which is seen to have a vital connection with his present knowledge will constitute for him a strong motive. For instance, when he knows the position, physical features, climate, and soil of Great Britain, he is ready to attack the question of the industries and products, because his present knowledge enables him to infer with fair accuracy what these industries and products are likely to be. Similarly, the student who has learned the main facts of Canadian History between 1791 and 1867 is ready to accept the British North America Act as a question to be considered. Since he knows the conditions which made the passing of the Act advisable, he is ready to suggest the measures that might be provided to remedy the existing evils. So, also, when the pupil has a grasp of the two mathematical

principles at the basis of the process, he is ready to apply this knowledge to the problem of dividing one decimal by another. There is no keener mental satisfaction than that which comes from the use of present knowledge in the conquest of new fields. In the orderly study of any school subject, therefore, the mastery of particular units of knowledge may be used to good purpose in confronting the child with further difficulties which demand solution. It is this possibility of developing new and interesting problems out of present knowledge that demands an orderly sequence of topics in the different school subjects—a fact that should be fully realized by the teacher.

CHAPTER XXI

AIMS IN CLASSROOM ACTIVITIES

IN THE teaching process, the instructor must distinguish between a genuine and an unreal aim or purpose. The former is one that the pupil feels to be his own, that suggests itself within a situation in which he feels a personal and active interest, and that is based upon his intrinsic tendencies and needs. The latter is one which is imposed upon him from without, and in the achievement of which he feels no direct personal interest. While it is inevitable in the modern school that there should be constant effort to arouse aims in the mind of the pupil, it is important that the pupil should realize these as his own personal aims, if he is to be actively interested in their attainment. If the pupil has not a direct and personal interest in the aim, there is small chance of his attending to the material presented, unless he substitutes a purpose of his own. The teacher should not, therefore, try to impose an aim on the pupil in an arbitrary way, but should try to connect it with a tendency or an interest already active. Only in this way can there be whole-hearted co-operation between teacher and pupil in the learning process.

It should be noted that the pupil's purpose is only a means to the accomplishment of a much wider aim in the mind of the teacher. This does not mean that teacher and pupil work at cross purposes; on the contrary, they should work in harmonious co-operation for ends which, in the final analysis, are identical. But the teacher, with greater maturity and wider experience, looks farther into the future, and works for ends of which

the pupil can at most be only vaguely aware. In other words, the teacher's aim is ultimate, and the pupil's more or less immediate. For instance, in the early work in primary arithmetic, the pupil's motive is often nothing more than the desire to handle the interesting objective material, while the teacher's motive is to train the pupil to react automatically to certain number combinations, that is, to develop habits. So, too, in the study of the rabbit, the pupil's motive is to find out something about an interesting animal, while the teacher's is to lead the pupil to make accurate observations and inferences, and thus to add something to his facility in thinking. Similarly, in the literature lesson on *The Solitary Reaper*, the pupil's aim is to find out what the poet has said about the Highland girl whom he saw during his pilgrimage to Scotland, while the teacher's purpose is to develop in the pupil an appreciation of the poem as an artistic creation, and thereby to deepen his interest in poetical literature.

In general, the pupil's purpose or aim will usually be found to consist in the acquisition of some knowledge or the performance of some activity that is interesting either to himself or because of its relation to some desired end. In general, the teacher's aim will usually be found to consist in securing the organization of old elements of the pupil's experience into new units of knowledge, or in creating certain emotional and volitional attitudes in the pupil, or in developing the pupil's skill through the establishment of useful habitual reactions. In any case, the teacher's aim should be the real and ultimate purpose in the learning process, and the pupil's should be a means, or a subsidiary stage, in the accomplishment of the real purpose.

VALUE OF AIMS

1. One of the obvious uses of an aim lies in the value that it gives to the ideas which aid in its attainment. For instance, the timidity of the rabbit is a fact which has little value to the ordinary child, except perhaps so far as it may cause him to protect his pets from unnecessary fright. But when he uses this known fact of the timidity of the rabbit to throw light upon the uses of the long ears, large eyes, and strong legs, the knowledge takes on a value that it did not have before. So, also, the knowledge of the short method of multiplying a decimal by 10, 100, 1000, etc., acquires a new value when it is used in dividing one decimal by another. The fact that there are cataracts in the Ottawa River is given a new value when it is applied to explain why the city of Ottawa has large lumber and paper-mills and produces electric power on an extensive scale. Furthermore, through the use of these old ideas in the attainment of a purpose, the child gains a control over the ideas just as he obtains control over the objects of his environment through using them in the attainment of his ends.

2. The possession of an aim by the pupil is useful in preventing the introduction of irrelevant material into the class discussion. Young children are particularly inclined to introduce interesting side issues that have been suggested by some phase of the work. As a rule, it is advisable to follow closely the straight and narrow road that leads to the end in view, and not to permit digressions into attractive by-paths. The teacher, however, must be careful to distinguish contributions which at first glance seem irrelevant, but which on further reflection may be useful, from those that are palpably irrelevant. For instance, in the discussion of the rabbit, a child may volunteer the information that he saw a

rabbit in the garden eating the cabbages, or that he saw his dog chasing a rabbit one day. Such asides may be turned to use by throwing light upon the nature of the rabbit's food and methods of eating, and upon the character of its flight. On the other hand, the contribution of a pupil who wants to tell about the rabbits he saw at the exhibition may well be ignored. If a pupil attempts to drag in irrelevant matter, he should be asked what the purpose of the lesson is, and whether his contribution will be of any value in attaining that end. The necessity of this will, however, be seen more fully in our consideration of the next phase of the learning process.

3. A clearly defined aim is valuable in helping the pupil to organize his knowledge. An illustration from another field will help us to understand this. If you take a friend for a walk along the streets of a strange city engaging him in interesting conversation by the way, and if, when you have reached a distant point, you tell him that he must find his way back alone, he will probably be unable to do so without assistance. But if you tell him at the outset what you are going to do, he will note carefully the streets traversed, the corners turned, the directions taken, and will likely find his way back easily. This is because he had a definite purpose before him. The conditions are much the same in the learning process. When the pupil starts out with no definite purpose and is led along blindly to some unknown goal, he will be unable to retrace his route; that is, he will be unable to reproduce the matter over which he has been taken. But with a clearly defined aim, he will be able to note the order of the steps and their relation to one another, and when the discussion is over, he will be able to go over the same course again. The facts will have become organized in his mind. This, also, will be more

clearly seen in our discussion of subsequent divisions of the learning process.

PRECAUTIONS REGARDING AIMS

If the pupils are to become interested in the aim of a lesson by recognizing a connection between it and their previous knowledge, the teacher must avoid placing it before them in a form in which they cannot readily see this connection. In other words, the purpose must be stated in terms that are understandable by the pupils. The teacher of grammar who announced, "To-day we are going to learn about case in nouns and pronouns", stated the aim in a form that was meaningless to the class. A better plan would be to draw attention to examples in sentences of nouns and pronouns showing this change, and then to say to the class, "Can we find out why these words are changed?" Similarly, to state as a purpose in history, "The Development of Responsible Government in Canada", would be to use terms too difficult for the class to interpret. It would be better to say: "Who is Prime Minister of Canada? Who are some of his Ministers? Have the people any control over these men? How may they exercise that control? Now, the people have not always had this control. Let us find out how they secured it." Instead of saying, "We shall study the municipal government of Ontario", it would be much better to proceed in some such way as the following: "A few days ago your father paid his taxes. Perhaps you heard him complain that they were very high this year. Do you know by whom and for what purposes these taxes are spent?" It will be noted that in all these cases an attempt is made to secure an intelligible aim related to the pupil's knowledge.

The aim of the lesson should be placed before the pupils in such a way that they will realize the need of the new knowledge. The announcement, "We are going to learn how to multiply fractions", might not be accompanied by any feeling of need on the part of the pupils. On the other hand, if the pupils were confronted with an interesting situation requiring the use of multiplication of fractions, the lack of his knowledge would be felt by them, and they would be actively interested in its acquisition. For instance, the teacher might propose problems such as the following: "The school on the second concession has a playground containing $1\frac{3}{4}$ acres; the playground of our school is $2\frac{1}{2}$ times as large: how many acres in our playground?" or, "John is $6\frac{1}{4}$ years old; I am $3\frac{1}{3}$ times as old; how old am I?" The attempt to solve these problems would reveal the lack of the necessary information, and this would give rise to the desire to learn how to multiply fractions. Similarly, in manual training, the desire of the pupil to make a hexagonal tray from cardboard would reveal the need of learning how to make a hexagon, and would create an attitude of ready activity with regard to its construction. This plan is followed in placing the aim before the pupils in the illustrative lesson on division of decimals.

FURTHER EXAMPLES OF MOTIVATION

A few additional examples drawn from different school subjects are here added, to illustrate further what is meant by creating a situation in which appears a definite need which the pupils wish to satisfy.

History

The teacher of a Form IV class was discussing with his pupils the exploration of Western Canada. The

subject for the day was the work of Sir Alexander Mackenzie as an explorer. Before the discussion began, the pupils were asked to take their maps of Canada, to trace the course of the Mackenzie River, and to calculate its length by means of the scale of measurement. Then on a map of British Columbia they were asked to trace the Peace River to its source, to follow along the Fraser, Blackwater, and Bellakula Rivers to the ocean, and to calculate the distance from Lake Athabaska to the Pacific Ocean along this course. Then the teacher said: "Less than a century and a half ago, no white man had ever seen the Mackenzie River or had crossed the Rocky Mountains. A famous Scotch fur-trader made two memorable journeys, the first to the mouth of the Mackenzie River, and the second across the Rocky Mountains to the Pacific. The story of these two journeys forms a splendid and stirring tale of hardship and danger. I want you to read this story". The lesson aim was thus adjusted to the interest of the pupils in stories of adventure and achievement.

Arithmetic

The pupils of a Form III class had learned to read and write fractions and to convert them into equivalent fractions. They were now ready to learn addition of fractions. The teacher sent several pupils to the blackboard to draw straight lines each exactly a yard long. They were then asked to divide these lines into equal parts, the first into two, the second into three, and others into four, six, eight, and twelve equal parts. Other pupils were then required to take coloured crayons to trace $\frac{1}{2}$ yard, $\frac{2}{3}$ yard, $\frac{3}{4}$ yard, $\frac{3}{8}$ yard, $\frac{5}{6}$ yard, $\frac{7}{12}$ yard on the respective lines, and to write the number indicating this measurement of the coloured part under each

line. Then the teacher said: "Suppose we placed all these coloured parts in one long straight line, how many yards would it be in length?" The pupils saw that they could not tell, because they did not know how to add fractions. This became, therefore, the aim of the lesson. The need of meeting a situation which could not be solved without particular information became the motive for effort.

Geography

The teacher was about to take up the topic Local and Standard Time with the Fourth Form class. He showed the pupils newspaper despatches from London, England, of events that apparently occurred after the newspaper accounts of them appeared. Thus, for example, the result of a boat race on the Thames occurring at two o'clock in the afternoon was reported in the noon edition of the Toronto daily newspapers. Some of the pupils recalled that on one occasion they rose at six o'clock in the morning to listen by radio to an address delivered by King George at eleven o'clock in London. The teacher also reminded the pupils that, if they took a journey across Canada from Toronto to Vancouver, they would have to set their watches back an hour on three occasions before reaching their destination, and if they went to Halifax, they would have to set their watches an hour ahead. How are these differences in time to be accounted for? This problem constituted an appeal to the curiosity of the pupils regarding a rather puzzling question, and its solution was a challenge to their powers of thinking.

Nature Study

The teacher of a Second Book class brought to school one morning a mounted specimen of the horned owl, and allowed the pupils to examine it at recess periods. She

suggested little problems relating to its colour, eyes, ears, beak, claws, etc., which the pupils could easily solve by mere observation. Next day the teacher spoke of the habits of the bird, its nocturnal flights, its food, its method of capturing its prey, etc., getting contributions from the pupils wherever possible. Then she asked the question, "Can we find out how this bird is fitted to do all these things?" This constituted an appeal to the natural interest of the pupils in a strange bird, and to their present knowledge of its characteristics and habits.

Grammar

The teacher of a Junior Fourth Form wished to teach the pupils the use of the adjective. He wrote on the blackboard two sets of sentences side by side:

Boys like apples.	Small boys like green apples.
Girls wear dresses.	Little girls wear pretty dresses.
Noises disturb people.	Loud noises disturb nervous people.

He asked the pupils to underline the words in the second group that are not in the first group. "Do you think you can find out the uses of these words?" The aim here constituted an appeal to the curiosity of the pupils and to their capacity of perceiving relationships.

Composition

The pupils of a Junior Second class were learning how to write compositions. The teacher inquired if any of the pupils had dogs, and received enthusiastic replies from the owners. She secured information regarding the names of the dogs, their colour, what they can do, what they eat, what they are good for, etc. Then the teacher said, "Now we are going to write a story about

Tom's dog. You will tell me what to write, and I shall put it on the blackboard. You must tell me how to spell the hard words, and where to put capital letters and periods. Now let us see what a good story we can write." The lesson was thus adjusted to the desire of the pupils to express themselves upon what was to them a very interesting subject.

CHAPTER XXII

THE RECONSTRUCTION OF EXPERIENCE

IN THE discussion of the acquisition of knowledge as a phase of the learning process in Chapter IX, it was shown that the reconstruction of experience is the fundamental law of intellectual growth. The essential factor in teaching is the provision of sufficient opportunity for the operation of this principle. That is, the function of the teacher is to assist the pupil in the most efficient way to reconstruct his experience in response to situations which he feels the need of meeting adequately. In our previous examination of the principle, it will be remembered that we referred to the various phases of mental movement in the reconstruction process, beginning with sense-perception, and rising through the higher thought processes—conception, judgment, and reasoning. In the present and three following chapters, we shall examine the principle of reconstruction in its relation to teaching, and we shall have occasion to refer in some detail to the various phases of the thought process.

Every one is familiar with the unusual and often amusing statements of young children in the presence of objects encountered for the first time. Their attempts to give meaning to the new experience often give rise to expressions that seem at the moment to be mere absurdities. For example, a small boy of three seeing for the first time a canary in a cage exclaimed, "Look at the chicken in the box". His reference to the chicken was explained by the fact that he was familiar with the toy chickens made of yellow cotton that are to be seen in shop windows at Easter time. Another small boy

watching a circus parade shouted, "Oh, look at the big animal with a tail on the end of his nose!" Two nine-year-old Eskimo boys who were recently brought down from the North to be sent to school in Ontario were quite unimpressed by the sight of such modern wonders as an automobile or an aeroplane. But they were intensely interested in a dray horse and loaded wagon which they saw on the dock at St. John's, Newfoundland. They exclaimed delightedly in their own language, "Oh, look at the big dog pulling the heavy load on the big sledge!" It is a familiar fact that the Indians of the western plains in the early days of the railway designated the locomotive the "iron horse". Similar instances may be supplied from the reader's own experience.

How are these strange statements to be explained? The answer is that the young child is slowly feeling his way in the process of adjusting himself to new experiences. He is faced with a situation which awakens ideas which he feels to have meaning in the interpretation of, and value in adjusting himself to, the situation. Since he has had a limited experience and possesses a comparatively small fund of knowledge, it is not surprising that, frequently, the ideas awakened by the situation are inadequate to a proper interpretation or a successful adjustment. Nevertheless, in meeting the situation he is proceeding in exactly the same way as the profoundest thinker who formulates some new and abstruse philosophical doctrine—he is reconstructing in a new form the ideas that appear to him to be of value under the circumstances. In the case of the boy who saw the canary in the cage, the situation awakened the familiar ideas, "chicken" and "box". These seemed to the boy to be relevant to the situation, and his organization of them into a new idea, "chicken in a box", was for him an

adequate solution of the difficulty. In the case of the second boy's interpretation of the elephant's trunk, the apparently useful old ideas of "tail" and "nose" were aroused and related together as a means of meeting the situation. So, also, in giving meaning to their experience of the dray horse and wagon, the Eskimo boys seized upon the familiar ideas associated with their life in the North—"dog", "sledge", "pull", "heavy", "load"—which were spontaneously awakened by the situation, and organized these ideas into the interpretation. And the Indians of the western plains gave a meaning to the locomotive by setting up a relationship between their familiar ideas of "iron" and "horse" which appeared to be relevant to the new experience. It will be observed that the illustrations quoted are examples of very simple reconstructions of experience of the sense-perception order. However, when we come to consider the reconstruction principle on the plane of the higher thought processes, we shall find the conditions in no way different.

The schoolboy "howlers", which cause so much amusement to the adult mind, are the result of limitations and deficiencies similar to those noted above. Lack of experience and knowledge frequently lead to absurd mistakes through the attempt to use inappropriate ideas to give meaning to new situations. They are often due to the inherent difficulty of interpreting unfamiliar language. One cannot always be sure that particular word forms or word sounds will call up the correct interpreting ideas in the mind of the child. The pupil who defined the equator as "a menagerie lion running round the earth" was obviously more familiar with the circus than with the imaginary lines of geography, and was using terms which had a meaning for him in interpreting words which are similar in sound but vastly different in

significance. Every teacher could quote numerous illustrations of the same tendency. A small boy once asserted that a skeleton key is made of old bones. A High School Entrance candidate in English literature explained the line, "Thy lay is in heaven", in Hogg's *The Skylark*, by saying that the bird builds its nest in the highest tree and lays its eggs there. A candidate in agriculture wrote: "The wireworm is injurious to farmers because it eats the wire fences and lets the cattle out". And a Normal School student, who was apparently better informed in the moral training of children than in the vocabulary of the baseball field, wrote: "Pupils should not be permitted to steal bases in a ball game. They should be shown that this is morally wrong, and should be compelled to return the stolen bases to the owners". These are typical examples of unfortunate reconstructions of ideas that the individual erroneously believed to be relevant to the situation by which he was confronted.

The difficulties in connection with the use of language suggest two precautions to be taken by the teacher. In the first place, in teaching children he should be careful to use language that they can understand, that is, language that calls up in their minds the correct old experiences needed to interpret the new ideas. And, in the second place, he should not be misled into thinking that pupils actually have interpreting ideas behind the language that they sometimes glibly recite. Both these precautions are necessary, because of the constant danger of assuming that the pupils have a foundation of direct experience sufficient to interpret the indirect experience presented by the course of study.

ESSENTIAL ELEMENTS IN LEARNING

Two facts emerge from the discussion up to this point: First, that the interpreting ideas for a new experience must be already in the mind of the learner as elements of old experience; and second, that the learner must himself bring forward from his old experience the items that he feels to be of value, and must set up relations among these for the interpretation of the new experience. In other words, if a new object or idea is to have any meaning at all, the learner must build up this meaning out of ideas already in his possession. In this statement is involved one of the most important laws of method, namely, that the pupil must bring to bear upon the presented situation relevant ideas from his former knowledge, and must organize these ideas into a solution of the difficulty. The teacher's function in this regard is to create situations that will arouse in the pupil's mind such old experiences as have a relevancy thereto, and will induce such a reconstruction of these experiences as will secure complete adjustment to the situations.

MEANING OF ANALYSIS

At this point the reader should be put on his guard against a possible misunderstanding of the learning process. It is sometimes said that new knowledge material is learned by analysing it into its elements and setting up relations among these elements. To be more specific, it is said that, in order to understand the meaning of a poem, or an event in history, or an experiment in science, or a problem in mathematics, the mind must take the vaguely understood whole, analyse it into its component parts, and synthesize these into the distinctly understood whole.

The only sense in which this statement is true is that the new material may be analysed into its elements only so far as these elements already exist in the mind of the learner as items of former knowledge. For instance, no amount of analysis of a triangle by a child of six will reveal anything more than three straight sides of varying lengths and three corners of varying sharpness. Why? Because no other features of a triangle have as yet been in the experience of the child. At a later stage of development, he may apprehend a third element, namely, that the angles are together equal to two right angles, but only when his geometrical experience permits him to do so. At a still later stage in his study of the triangle, he may be able to arrive at the formula for the area in terms of the sides, but only when his experience in trigonometry gives him this ability. Similarly, no amount of analysis of a Greek poem by a person wholly ignorant of Greek will give a comprehension of its meaning, because his past language experience gives him no assistance.

The so-called analysis of new knowledge material by a learner must consist, therefore, in his projecting into it such of his past experiences as are relevant to its interpretation. The factors which enter into a definite knowledge of the presented material do not come out of, but rather are read into, the material. The learner does not get his new experience directly out of the presented material, but builds up his interpretation out of elements of former knowledge. In other words, the learner sees in the new material only such factors as his former knowledge enables him to see. To analyse new knowledge material, therefore, can have no other meaning than to analyse one's experience, in order to find those elements whose reconstruction will interpret the presented knowledge. To say that the mind analyses

the unknown object in any other sense is to confound mental interpretation with physical analysis.

SITUATION DETERMINES RELEVANCY OF AWAKENED IDEAS

The reader should note, further, that it is the situation confronting the learner that determines the relevancy of the ideas that are awakened. The mind has the ability to measure the suitability of the ideas for the purpose of interpretation and to reject those that are felt to be valueless. For instance, in the study of the adaptations of the rabbit (Chapter XVIII), a pupil may recall his pet rabbits at home, or a fine variety he saw at an exhibition, or an incident when he went rabbit hunting, or a rabbit story that he recently read. He is able, however, to reject these ideas as irrelevant for his present purpose, and to lay hold upon others that seem better suited to meet the situation. The reason for this is that the purpose of the lesson is at least partially understood from the beginning, and this vague comprehension enables him to decide with some accuracy whether the ideas that flock into his mind have a relevancy to his purpose. He knows enough of the nature of the adaptations of the rabbit to feel that the ideas cited above will not be of any value in the difficulties presented in his study of the animal.

MEANING OF SYNTHESIS

The organization of the elements of past experience into a new experience is sometimes called a process of synthesis. This term synthesis must, however, be used with the same care as has been noted in regard to the term analysis. Synthesis does not mean that totally new elements are unified, but rather that suitable elements of old knowledge are read into the presented

material and are organized into a new unit. This organization of a unit of knowledge is often a matter of slow growth extending over a period of years. For instance, the child's earliest idea of a circle is a space inclosed by a curved line. By measurement later, he discovers that all parts of this curved line are equidistant from the centre, and he synthesizes this element with his original idea of a circle. He is taught, also, the meaning of diameter, radius, circumference, and discovers by measurement the mathematical relations among them. These features are synthesized with his former idea. He is taught the relation of the radius to the area, and this factor is added. Still later, his geometrical experience gives him a knowledge of the relationship between the angles subtended by an arc at the centre and at the circumference, and an additional element is incorporated into his idea. Thus the pupil's knowledge of the circle expands gradually through the synthesis of successive experiences with his former knowledge, each element being added to the idea when it has become part of his experience.

INTERPLAY OF ANALYSIS AND SYNTHESIS

It will be seen from this example that the processes of analysis and synthesis do not go on separately and as totally distinct operations. All the elements required in the interpretation of new knowledge material do not emerge from past experience at the outset of the learning activity, and then relate themselves together into the new idea. On the contrary, the process is one of continuous and concurrent analysis and synthesis, as the thinking activity progresses. A few ideas, it may be, are aroused by the situation, and are organized at once; others emerge later, and are synthesized with these, and

so on till the solution of the difficulty is achieved. The growth of a pupil's knowledge of a plant, an animal, a country, a picture, a poem, an historical topic, a mathematical problem, or a scientific experiment, exemplifies this principle. The adequate interpretation of any of these requires the continual interplay of the analytic and synthetic processes. For instance, note how the pupil's knowledge of the cat is built up. First he sees that the cat catches and eats rats, mice, and birds. These facts will be organized into a unit of knowledge regarding the animal's food. Later, he observes that the cat has sharp claws, padded feet, long sharp canines, and a rough tongue. These facts are also organized into a unit of knowledge regarding the animal's physical characteristics. These two units are related in a more comprehensive unit when the child perceives that the cat's teeth and tongue are suited to tearing flesh and cleaning it from the bones, and that its claws and padded feet are suited to surprising and seizing its prey. Many other examples of the interplay of the analytic and synthetic processes will be found in the illustrative teaching lessons when we examine these in detail in Chapter XXV.

The reconstruction process does not operate within the single unit of knowledge alone, for, as each unit is organized, it will be related with former units in the same subject. The pupil will discover a coherence within the limits of a single subject, such as grammar, arithmetic, history, and geography. In this way various groups of ideas will organize themselves into larger divisions within the subject, as the pupil discovers the threads of unity which bind the groups together. Thus in grammar, one series of knowledge units is organized into a complete knowledge of the noun. In arithmetic, a sequence of studies in profit and loss, trade discount, simple interest,

bank discount, etc., is organized into a comprehensive knowledge of commercial arithmetic. In history, a series of discussions on the achievements of La Vérendrye, Mackenzie, Thompson, Selkirk, etc., is organized into a knowledge of the exploration and opening up of the Canadian West. A series of studies on the physical features, climate, products, industries, commercial centres, and means of transportation, of the various natural divisions of Canada, is organized into a system of geographical knowledge of Canada as a whole. It is thus that the mind is able to construct its smaller divisions of knowledge into topics, and its topics into organized groups or systems of knowledge.

THE SO-CALLED STEP OF PREPARATION

Writers on educational method have frequently laid much emphasis upon the preparation stage of school lessons. They have pointed out that, in the interpretation of new lesson material, the pupil must use his past experience. What could be more natural, they ask, than that these interpreting ideas should be recalled at the beginning of the lesson, in order that they may be ready at hand for use in organization when the new material is presented? This presumed necessity has led teachers and educational writers to formulate what they regard as an essential element in lesson procedure, the so-called "step of preparation".

There are good reasons to object to the step of preparation as a distinct part of the teaching process. In the first place, as applied by its advocates, it is often an exceedingly mechanical procedure out of harmony with the way in which the mind naturally acts. It is based upon the false analogy of procedure in the physical world. It is true that the carpenter before starting a job lays

out his tools and materials in systematic order, so that he can reach them without waste of time, and the cook before baking a cake gathers the utensils and ingredients and arranges them in order, so that the proper combination may proceed without interruption. But, as has been indicated in the paragraphs dealing with analysis and synthesis, the mind does not work in that way. To assume that it does is to confound physical action with mental action. To attempt to recall all the interpreting ideas at the outset of the lesson and later to arrange them in their proper combinations would be carrying formality and mechanical procedure to its utmost height.

The advocates of the separate and distinct preparation step are, of course, right in their insistence upon the recall of relevant old experiences as a basis of the interpretation of the new. Interpretation is impossible in any other way. But this cannot be economically accomplished by dragging forth these old ideas without any purpose or need that is evident to the pupil. How then is this necessary recall to be achieved? The answer has already been suggested in another connection. The real preparation for the lesson goes back to the motive stage. That is, in confronting the pupil with a situation to which he desires to adjust himself, the teacher has provided the conditions under which the interpreting ideas are naturally awakened. They appear spontaneously, or are recalled of the pupil's own accord; they are not dragged out mechanically without apparent need.

This natural preparation through the creation of the situation may be illustrated by reference to a lesson in literature. Suppose the teacher wishes to study with the pupils James Blanco White's magnificent sonnet, *Mysterious Night* (page 32, *Shorter Poems*). He might say: "Here is a poem that refers to the stars at night.

I want you to think of their immense numbers, their tremendous size, their immeasurable distances. When can you see these stars? Why can you not see them during the day? Now let us read the poem". In getting the situation before the pupils in this way, the teacher has provided for the arousal of the essential ideas to give meaning to the poem. The same feature may be noticed in the illustrative lessons in Chapter XVIII, and in the examples of motivation in Chapter XXI.

It is not suggested, of course, that all the interpreting ideas are set forth in battle array in a preparation of this kind. As has been already shown in foregoing sections of this chapter, the great bulk of the interpreting ideas will be recalled, not at the beginning of the lesson, but during the course of the development. This feature will be evident in the analysis of the illustrative lessons in Chapter XXV. The so-called preparation step, therefore, cannot properly be regarded as a distinct phase of lesson procedure. The purposes that it seeks are adequately accomplished in two ways, namely, through the motivation phase in the presentation of a situation, and through the development of the organization of the material in the pupil's mind as the lesson proceeds.

One further suggestion with regard to the reconstruction of experience may be made before leaving this phase of the subject. The most active, vivid, and powerful ideas in the pupil's mind are those which are closely connected with his life. This suggests the desirability of using, wherever possible, the ideas associated with his surroundings and his activities. The teacher should miss no opportunity of establishing cross connections between the subject-matter of school studies and the direct experiences of the pupil outside the school, and of motivating this subject-matter by using

as interpreting elements the realities of the pupil's everyday life. When this is done, not only will the new experience have a much greater interest attached to it, but it will also be given an intensity and vividness that will make it a permanent possession.

CHAPTER XXIII

PARTICULAR AND GENERAL IDEAS

IN OUR analysis of the learning process, we have found that mental growth is brought about through the reconstruction of experience. In the last chapter it was shown that new knowledge is built up by the re-organization of old ideas. In the present chapter we shall examine in more detail the various methods by which this re-organization or reconstruction of ideas proceeds. Already in Chapter IX we have discussed these methods in brief outline, and the reader will recognize them at this stage as old acquaintances.

As I write these words, I hold in my hand a red hexagonal pencil about six inches long, with black lead, and with the manufacturer's name stamped upon it in gold letters. I have also a memory of a short, round, marking pencil about three inches long, with blue lead, which I keep in a particular drawer of my desk in the office. So, too, I have a picture in my mind of a big purple pencil two feet long and an inch in diameter, with red lead—a purely imaginary pencil which never had any real existence. Each of these three ideas relates to a definite individual object or image, and is, therefore, called a *particular* idea.

But I have also an idea *pencil* which embraces all pencils of all shapes, lengths, sizes, colours, and kinds of lead. If you were to ask me to define this idea, I should probably give the very vague statement that a pencil is something inclosing lead and used to make marks. This idea is *general*; it applies, not to an individual object, but to a great class of objects, and it

includes only the characteristics common to the whole class.

Your idea of the book before you, gray-coloured, hard-covered, with white paper, printed in black ink, stamped *Ontario Teachers' Manual, Geography*, is particular; your idea *book* embracing the common characteristics of all books—paper pages bound together—is general. The difference between particular and general ideas as applied to objects is so obvious as to need no further illustration.

But this distinction between particular and general ideas holds, not only in the sphere of objects, but also in the sphere of statements or judgments. For instance, when a pupil, by dividing a group of eight blocks before him into two smaller groups, says that 5 blocks and 3 blocks are 8 blocks, his idea is particular; but when he makes the statement $5+3=8$, his idea is general. When he says, "This piece of land has water all around it", he expresses a particular idea, but when he says, "An island is a body of land surrounded by water", he expresses a general idea. When a pupil, in analysing the sentence, "The weather grew warm", says that "warm" is a subjective predicate adjective completing 'grew' and modifying 'weather', he is expressing a particular idea. But when he says, "A subjective predicate adjective completes the verb and modifies the subject", he is expressing a general idea. Similarly, the idea, "The air above this radiator is rising", is particular, while, "Heated air rises", is general. "After the removal of the stern rule of the Puritans, the English people plunged into excesses in Charles II's reign", is a particular judgment, but, "A period of repression is followed by a period of license", is a general judgment. It will be plain to the reader that particular judgments refer

to individual and specific facts, while general judgments express universal laws.

It should be observed, however, that *particular* and *general* ideas are only relatively particular or general. At our present stage of development, we never have ideas that are absolutely particular. My particular idea of the pencil with which I am writing involves such universal elements as long, red, hexagonal, wood, lead, and hence it cannot be considered absolutely particular. So, too, the pupil's statement that "warm" is a subjective predicate adjective modifying the subject "weather" and completing the verb "grew", involves several general elements—adjective, predicate adjective, subjective predicate adjective, modify, subject, complete, verb. And so with all our so-called particular ideas—they all have a more or less universal aspect.

Similarly, general ideas are general only in relation to other ideas of a lower order of generality. The idea, subjective predicate adjective, is less general than predicate adjective, which in turn is less general than adjective, while the latter may be regarded as a particular in relation to the more general idea, modifying expression. The idea that unsupported bodies fall to the earth is less general than the law of gravitation. "Air expands when heated" is less general than, "Gas expands when heated", which in turn is less general than, "Heat causes expansion in solids, liquids, and gases". "Periods of repression are succeeded by periods of license", while general from one standpoint, is nevertheless particular in reference to the universal "Action is followed by reaction".

Thus it will be observed that the two terms, particular and general, may be applied to ideas only with reservation. When they are used, it will be understood

that the absolutely general or absolutely particular is not meant, but only the relatively particular or relatively general.

HOW PARTICULAR IDEAS ARE ACQUIRED

Let us now inquire as to the ways by which the mind acquires its particular ideas. Turning again to the outline lesson plans given in Chapter XVIII, we shall have abundant material for illustration. We shall find that particular ideas fall into three fairly well defined groups, and come to the mind through somewhat different mental processes.

Through Sense-Perception

In the study of the rabbit, the child obtains ideas of colour, softness of fur, length of ears, position of eyes, size of hind legs, chisel-like sharpness of front teeth, etc. These ideas quite evidently come through bringing the senses to bear upon the animal used for observation purposes. It is not meant that these ideas are wholly sensory, but that certain elements recalled from past experience are united with the sense impressions actually present to produce what are usually called sense-perceptions. Similarly, in the study of Ottawa, the ideas of the waterfalls in the river, the power plants, and the lumber and paper-mills, may come through sensory avenues, if the pupils have an opportunity of visiting these places.

In other places in this Manual, it has been pointed out that sensory impressions are the earliest of the child's ideas, and constitute the raw materials, as it were, of his later mental products. The child comes to school with a considerable equipment of sensory experience obtained by direct contact with the things in his surroundings. He began his learning in that way, and the school

should continue the same process. It is highly important, therefore, that the teacher should approach the learner's mind wherever possible through the avenue of sensory experience. Objective materials should be largely used in the early lessons in reading, language, and arithmetic. In higher classes, in such subjects as geography and history, what might be called semi-objective materials, in the form of pictures, diagrams, sketches, maps, lantern slides, etc., may be used to good effect on account of their sensory appeal. Subjects like physiography, physics, chemistry, cannot be taught effectively in any other way than by experiment with, and observation of, concrete materials. Nature study, botany, and zoology require first hand observation of the objects studied. Training for the various trades in vocational schools involves sense-perception as a fundamental requirement. Much of the most valuable work of the schools consists in the solution of problems regarding the plants, animals, and other objects in the environment by means of observation outside of the school.

Through Imagination

To the second group of particular notions belong the ideas of the rabbit's flight, its method of peeling bark from trees, and its method of excavating its burrow. These may be within the observation of some pupils, in which case they are sensory experiences. But, in the case of the majority, the ideas will come through verbal description, and, hence, through the imagination, by means of the selection and reconstruction of old experiences, many of them of a sensory character. So also in the geographical discussion of the importance of Ottawa—the idea of the lumber operations in the forests of the upper Ottawa, the idea of floating the logs down the

rivers and collecting them in booms, and the idea of the processes in the manufacture of lumber and paper, especially in the case of pupils who cannot have actual contact with these operations, come through the avenue of the imagination. In the study of *The Solitary Reaper*, a large number of the ideas come through imagination. The student will be able to locate many of these without assistance.

The importance of sense training, to which reference was made in the previous section, lies not merely in the knowledge that it gives regarding the objects of the environment, but more particularly in the store of imagery which it provides. Much of the material which the child uses in his thought processes consists of the images obtained through sense-perception. It is, therefore, evident that the child's future efficiency in thought depends in large measure upon the opportunity he has for sense-perception. The teacher who gives the child a great fund of useful experiences through every avenue of sense-perception is giving him the best sort of preparation for his future thinking operations, and especially for his future appreciation of literature, history, and geography. These sensory experiences are available in the form of imagery for the interpretation of future experiences through reconstruction.

Through Deduction or Inference

In the third group we place ideas of the characteristics which in special ways enable the rabbit to see, to hear, to run, to hide, to obtain its food, and thus avoid its enemies and maintain its existence. To this group also belong such ideas as the reasons why Ottawa has become a centre for the lumber and paper industries, a railway centre, and a centre for the wholesale trade. In the

study of *The Solitary Reaper*, the pupil explains why the poet uses repetitions, comparisons, direct address, and questions, and the ideas embodied in his answers belong also to this group. All of these ideas are obtained through the process known as inference or deduction.

This method of obtaining particular ideas requires a brief investigation. If the pupil's thinking in the interpretation of the rabbit's adaptations were analysed and set down in a formal way, it would run somewhat as follows:

1. Small and timid animals require keen sight, sharp hearing, and swift flight in order to escape their enemies.

The rabbit is a small and timid animal.

Therefore, the rabbit requires these special characteristics to enable it to escape its enemies.

2. Large eyes placed well to the side of the head enable an animal to see danger quickly.

The rabbit has large eyes placed well to the side of the head.

Therefore, the rabbit is able to see danger quickly.

And so throughout the consideration of all the other adaptations.

Similarly, if the pupil's inferences in the study of Ottawa were expressed formally, they might be set down after the following manner:

Waterfalls are sources of electric power.

The city of Ottawa has large waterfalls at its door.

Therefore, the city of Ottawa is a potential producer of electric power.

Likewise, in the study of *The Solitary Reaper*, the pupil makes several inferences, which if formally expressed, would be similar to the following:

Comparisons, direct address, questions, repetitions, give vividness to a poem.

The Solitary Reaper exhibits all these devices.

Therefore, this poem has vividness.

So, also, in the lesson on the taper-shank twist drill, the student makes several inferences which, if set forth in a formal way, would resemble the following:

A file will cut anything but very hard substances.

This drill is not affected by a file.

Therefore, this drill is a hard substance.

It will be noted that each of the above groups consists of three statements, the first a general law, the second a particular fact having relation to the law, and the third an inference resulting from a perception of this relation—an example of the reconstruction process. This formal arrangement of judgments is called a *syllogism*, and the process is called *deductive reasoning*. It is not suggested that the pupil, in reasoning deductively, consciously marshals his judgments in the syllogistic manner. As a matter of fact, he seldom reasons in this formal way. The syllogism is merely an orderly and logical arrangement of what occurs in his mind in a somewhat unsystematic way.

It is thus apparent that the mind obtains its particular ideas through three avenues—sense-perception, imagination, and deduction. It will be a useful exercise for the student to analyse several other examples of the learning process, to find further examples of the three methods of gaining particular ideas, and, in the case of deduction, to throw the various judgments into the syllogistic form.

HOW GENERAL IDEAS ARE ACQUIRED

We shall now investigate the processes by which the mind obtains general ideas. As pointed out in a foregoing paragraph, these ideas may consist either of general notions symbolized by single words or short phrases, or of general laws expressed in a sentence or judgment. The processes and the product in each case are much the same, but for convenience it is usual to designate them by separate names. The gaining of general notions symbolized by single words is called *conception*, and the gaining of general laws expressed in judgments is called *induction*.

Conception

The processes involved in forming a concept may be illustrated from the way in which a pupil gains the idea *island*. For the pupil who lives on the shore of Georgian Bay or the River St. Lawrence, within sight of numerous islands, this will be a comparatively simple process. His idea will grow naturally out of his experience of observing many islands. But to the pupil who lives inland many miles remote from any large body of water, the process will be much more complicated. In the latter case, the child may hear the word *island* first employed in connection with a sand-table exercise in the classroom, or perhaps in connection with a little piece of earth uncovered by water in a pond in the playground after a heavy rainstorm. To him *island* means just a little heap of sand or a bit of earth surrounded by a pool of water. It is a particular idea, and yet it contains general elements—sand, little, water, surround. Later, in a geography excursion to a nearby creek, the pupil sees a bit of land with grass growing on it in the midst of the water. This he recognizes as an island from his former experience of

the sand-table. His original idea undergoes a slight change by comparison with the new experience. The element *nothing growing* is eliminated. Later experiences with pictures of islands and descriptions of islands further modify the idea, and the element of size is dropped. Eventually, the idea of island resolves itself into that of land surrounded by water. It will be noted from this description that the idea is in some respects general from the very first experience, for it always contains general elements and is applied to interpret later experiences. These later experiences cause a modification of the idea through the dropping of individual differences, and the gradual reduction of the points of likeness. It is apparent, therefore, that the concept is a matter of slow growth, that it is constantly changing as new experiences with individual objects are met, that it narrows in content as individual differences are dropped, and that, occasionally, it widens in content through the discovery of similarities at first unsuspected. Examples of the latter fact are seen in the inclusion of the lapping characteristic in the idea *dog*, and the two-right-angledness characteristic in the idea *triangle*. Both of these qualities are likely to be discovered rather late in the formation of the concepts.

Induction

The processes involved in induction may be observed in the method of arriving at the two laws on which the division of decimals depends, as set forth in the illustrative lesson on this topic in Chapter XVIII. Reference to these will be made at a later stage in Chapter XXV. At this point a detailed analysis of another example, for instance, the squaring of a binomial in algebra, will be attempted as a means of clarifying the inductive process.

A pupil who examines the result of the multiplication of $a+b$ by itself can scarcely fail to have some inkling of the rule for squaring a binomial. In the expression $a^2+2ab+b^2$, he will probably see the square of each term and twice their product. He wonders if he has possession of a general law. His second effort—the squaring of $x+y$ —makes him slightly more certain that his suspicion is correct. But these two expressions are identical in form, and perhaps, if a wholly different form is tried, the results may be different. So he tries an expression like $(2a+3b)^2$. The result verifies his original idea. Subsequent trials with varied expressions, for example, $(x-y)^2$, $(3a-2b)^2$, $(-2x-4y)^2$, etc., give further confirmation, and presently he is ready to formulate the rule for squaring a binomial.

This illustrates the normal procedure in induction. It is apparent that there is a vague grasp of the general law from the first particular example studied. This vague idea is a sort of working hypothesis which is tested by subsequent examples. If the hypothesis holds true after a reasonable number of varied tests, it assumes the dignity of a universal law.

Most scientific discoveries are made by this method of induction. The scientist makes an observation or performs an experiment. He forms a tentative hypothesis to explain the results. He tests this by another observation or experiment of similar character, but with some element of variation. If the hypothesis holds good, he is slightly more confident of its truth, and if all subsequent trials confirm it, he assumes that he has possession of a law. But if at any time in the series of observations or experiments, the hypothesis breaks down, the scientist modifies it or discards it altogether, and substitutes a new hypothesis to explain the antecedent facts. This

he tests as before, but continues until eventually he finds one which holds in every case.

It is evident that, to be reasonably safe, induction requires that a sufficient number of typical and varied examples be examined. Many mistakes in inductive reasoning occur through generalizing from too few examples or from examples that are not typical. To say that a university education is useless, because a particular graduate made a failure of his life, is an instance of unjustifiable induction, because the one example chosen is insufficient for the generalization and is, moreover, not typical of the whole class of university graduates. In the teaching of grammar, mathematics, and science, in which subjects induction has its greatest field, it is of the utmost importance that the pupil should be guarded against hasty generalization from insufficient and untypical examples.

The teacher should be warned against another common mistake in the inductive learning process. It is sometimes assumed that the pupil can hold his judgment in suspense with regard to the general law until he has examined the whole series of examples or experiments, and then, by a single comparison of the whole series, evolve the law. In other words, it is assumed that the analysis of examples, comparison, and generalization, are separate, distinct, and successive processes, occurring in the order named. But as a matter of fact, as has already been pointed out, the general is vaguely grasped from the first example considered, and the analysis of subsequent examples merely confirms what has been suspected from the first. That is, analysis of examples, comparison, and generalization, are concurrent and inseparable processes. Consequently, as each example in an inductive learning process is studied, the pupil should

be constantly encouraged to note whether his first vaguely-grasped generalization is confirmed.

In the light of the discussion in Chapter XXII, the reader will have no difficulty in showing the presence of the reconstruction process in the building up of general ideas through conception and induction. Nor will he fail to note the constant interplay of the inductive and deductive learning processes, as witnessed in the study of division of decimals.

IMPORTANCE OF PARTICULAR AND GENERAL IDEAS

There remains to be considered the question of the relative importance of particular and general ideas. On the one hand, particular ideas are valuable, because they give us knowledge of the qualities of the things in the environment, so that we may determine the use to make of these objects. For instance, a particular chair is comfortable to sit in, a particular pen agreeable to write with, a particular blackboard easy for the pupils to see. But the most important function of particular ideas is that they lead to general ideas. Most of them, in fact, are useful only as they form a basis of the general.

On the other hand, the ability to form general ideas through conception and induction simplifies and systematizes the process of thought. If the mind were capable only of particular ideas, we would not progress very far in the thought process. Thinking would be retarded and rendered ineffectual by the very multitude of unrelated ideas. The fact that we are able to consolidate a host of particular ideas into a single general idea or law conduces, therefore, to economy and order in the thinking process. Moreover, the use to which we put the particular objects in the environment depends largely upon our general ideas. For instance, we seize

a hammer to drive a nail to mend the gate, because of our general notion that a hammer is for driving, a nail is to be driven, and gates are mended that way.

What is true of thinking is equally true of communication. Every word in the language symbolizes a general idea. When I speak to you, I translate my thoughts into words, which you in turn translate into your thoughts. The reason that we can communicate with each other is that, though our particular ideas may be very dissimilar, we have general ideas in common that are sufficiently alike to make us intelligible to each other.

General ideas are, therefore, valuable, because they simplify, systematize, and economize the processes of thought and communication, while particular ideas are mainly valuable in that they point forward to, and illustrate, general ideas.

CHAPTER XXIV

EXPRESSION AND APPLICATION

ANYONE who has watched the activities of children will easily be convinced that their ideas are closely associated with motor action. To a child, an idea in the mind is a signal for some kind of bodily activity. To think of doing something is to set off the tendency to do it. Though in time he learns to inhibit or suppress certain forms of action, the tendency to express his ideas in some outward way remains throughout life. As a matter of fact, knowledge is valuable largely because it is a guide to action. In other words, what one knows is useful only as it affects one's behaviour. Conduct is of supreme importance in life, and an individual's conduct is determined largely by his knowledge.

It is this fact that makes the expression or application of knowledge so important a part of the learning process. While instruction, as we have seen, controls the learning process by giving the child possession of valuable social experience through the proper direction of the reconstruction process, it should also promote the ability to do things through correlating the acquired knowledge with suitable forms of application or expression. In other words, instruction should influence action and conduct, and thereby determine character.

TYPES OF EXPRESSION

Expressive acts are of many types. A few examples will serve to illustrate their great variety. When a child sees a bright-coloured object, he reaches for it, grasps it, and carries it to his mouth; when he is hurt, he distorts

his face and cries aloud; when he sees his mother, he smiles and makes sounds and movements expressive of delight. When a boy sees an amusing incident, he laughs; when he hears a sad story, he has "a lump in his throat" and sheds tears; when he is angry, his face grows red, his muscles become tense, and he strikes a blow; when he sees his mother behind with her housework, he seizes a cloth and dries the dishes. When a man rides in a motor car beside the driver, he presses on the foot-board when he sees that the brakes should be applied; when he hears a good speech, he claps his hands and shouts approval; when he sees a friend in difficulty, he goes to his assistance or lends him some money; when he conceives how he may launch a successful business venture, he proceeds to put it into effect. The reader will be able to supply illustrations of various forms of expression from his own experience. Such examples suggest that every impression, idea, or thought, tends to work itself out in some form of motor expression.

A casual examination of these examples of expressive activities will show that they correspond with the three types of response discussed in Chapters VIII and IX. Several of the activities are reflex or instinctive, some are habitual, while others are consciously directed.

As has been already stated in another connection, the significance of the inherited types of action in education lies in the possibility of their development into conscious or habitual reactions. For instance, all the myriad forms of motor activity exhibited in human conduct, when traced back to their origin, have their basis in the inherited tendency to physical movement. The child begins life with a few native motor tendencies that are at first under no conscious control. Gradually, by fixing attention upon the simple actions he performs, he obtains

ideas of certain movements. Through these ideas he slowly and gradually gains the ability to perform the movements voluntarily. This marks the beginning of motor control. As time goes on, the child gets the ability to group together simple movements in various combinations. In other words, he begins to reconstruct his activities, and gradually to perform more and more complicated physical movements. Thus the child in time secures increasing facility in controlling his motor responses.

The bearing of this upon certain types of expression will be at once apparent. For example, in the case of writing, the original basis is the general tendency to physical movement. In time the pupil secures, by the method set forth in the previous paragraph, a control over a complicated system of hand movements. These are at first conscious, but in time, with repetition and attention, develop into movements that are almost exclusively habitual. The acquisition of speech exhibits the same stages of development. Similarly, the ability to use effectively the objects, utensils, tools, and conveniences of the environment, springs originally from the inherited motor tendencies, advances gradually through the stage of conscious control, and emerges finally as a system of well-established habits.

In like manner, many types of expression come originally from the tendency to imitate. Forms of speech, methods of dress, graces and refinements of manner, neatness of arrangement of belongings, etc., are to a large extent the effect of the imitative tendency, producing at first actions that are consciously directed, and later are converted into confirmed habits. It may be shown in the same way that the constructive tendency operates similarly to produce, first, conscious acts, and

later, useful habits. It is thus evident that many of our inherited tendencies have an educational significance, because of their eventual development into valuable types of expressive actions, either conscious or habitual.

Most of our conscious actions involve elements that have become habitual. For instance, in writing a composition, a pupil develops his subject and arranges his materials consciously, but he writes, spells, and applies grammatical rules in a purely habitual way. So, too, in solving a problem in arithmetic, the logical arrangement of the various inferences which constitute the solution is a highly conscious act, but the manipulation of the arithmetical processes, the additions, multiplications, divisions, etc., is a matter of habit. These actions were, at one stage in their evolution, consciously performed, but, on account of their frequent occurrence as elements of conscious acts, it became economical to reduce them to fixed habits. So far as these actions have become purely habitual, they can scarcely be called expressive acts. Their significance lies in the fact that they greatly facilitate the expression of ideas in conscious acts. Thus in speech, writing, playing a musical instrument, operating a typewriter, etc., the mechanical movements go on largely without direction, while the mind is consciously occupied with the ideas that are being expressed.

As a stage in the learning process, expression must deal mainly with consciously directed action, since its real purpose is to correlate new knowledge and action. But, while this is true, it has also to do with inherited tendencies as the basis of conscious action, and with habitual responses which are always present as elements of conscious action.

EXPRESSION VERSUS APPLICATION

The two terms, *expression* and *application*, are often used synonymously. Undoubtedly, in certain cases they may be considered as identical in meaning, and may be used interchangeably. For instance, the table made by a boy in the manual-training classes may be regarded as the expression of an idea in his mind, or as the application of certain principles of construction which he has learned. Similarly, the establishment of a system of public education may be regarded as the expression of an idea in the mind of the builder, or as an application of certain recognized educational principles. In these and similar instances which the reader may readily supply, the result of the activity may be designated correctly by either term.

However, there are many cases where only the term *expression* could properly be used. For instance, the smile of the child when he recognizes his mother, the blow struck by the boy when he is insulted, the kindly act performed for the person in distress, the singing of a song so as to convey the feeling intended, the dramatic reading of a fine poem, the modelling of objects in plastic material, might appropriately be called forms of expression, but not forms of application. On the other hand, such exercises as the solution of problems in mathematics, the use of physical laws to explain the phenomena of geography, the analysis of sentences or the parsing of words in grammar, the hem-stitching of a table cloth, or the drawing of an object in proper perspective, while they might from some standpoints be called forms of expression, would more appropriately be designated as forms of application.

It would appear, therefore, that expression is the more inclusive term, and that application is limited to a

special field of expressive actions. We express in some outward way our ideas and emotions; we apply principles in the solution of problems, the explanation of conditions, the planning and construction of things from book-ends to bridges. Expression has to do with ideas and emotions; application with principles and laws. Ideas are not always principles, but principles are always ideas, though of a special kind. Consequently, application may be regarded as a special form of expression. The student must use careful judgment in deciding which term to employ under particular circumstances.

EXPRESSION OR APPLICATION AS A PHASE OF THE ILLUSTRATIVE LESSONS

The expression or application stage in each of the illustrative examples of the learning process in Chapter XVIII will easily be recognized by the reader. In the study of the rabbit, the expression consists in an oral or written account of the various ways in which the rabbit is adapted to its environment, and in sketching pictures of the rabbit in various positions. But the most valuable form of expression, as a result of this study, will come in the form of a modification of the future conduct of the pupil. For instance, he will develop an attitude of kindness towards his pets and harmless wild creatures that will result in a tendency to care for and protect rather than to ill-treat and destroy. Further, he will develop an attitude of inquiry towards the adaptations of other animals to the environment in which they live.

In the geographical study of Ottawa, the expression resembles that of the nature study of the rabbit referred to in the last paragraph. The pupil is required to give a connected oral or written summary of the factors that

have contributed to the growth of Ottawa. But the most important form of expression will be the tendency to look for the conditions that account for the importance of large cities wherever they are found, and, in general, to look for causes to explain geographical conditions. The principles used in explaining the growth of Ottawa may find application in accounting for the importance of other cities.

After the literary study of *The Solitary Reaper*, one form of expression is the appreciative reading of the poem by the pupil. Another is the selection of the striking features of the poem, for example, the finest pictures, the devices to give vividness to the scene, the most musical lines, etc. The poem also lends itself to illustration in a pictorial way. But, if the pupil voluntarily searches out and reads other poems by Wordsworth, the teacher may well regard that as the most successful type of expression.

The recognition of the stage of application in the learning of division of decimals presents no difficulty; the pupil applies the rule he has learned in the solution of problems in which it is involved.

The expression phase of the lesson on the twist drill would consist in a description of the tool, with careful explanation of the function of each feature. An application of the knowledge gained would come in the use of the drill for the purpose and with the care suggested by the knowledge of its construction. Another application would come in the proper grinding of the tool when this was necessary.

EXPRESSION AND APPLICATION AS PHASES OF RECONSTRUCTION

Neither expression nor application should be regarded as a separate step in the learning process. In reality

each is merely a phase of the reconstruction of experience. This will readily be seen from an analysis of examples. The pupil who tells in his own words the story of *The Solitary Reaper*, after the study of the poem, is merely selecting the important ideas obtained during the study, and organizing them in the form suggested by the poem. The pupil who writes an account of the adaptations of the rabbit simply re-combines in a connected way the facts that have been elucidated during the progress of the lesson. The pupil who creates an original story illustrating the theme suggested by *The Crow and the Pitcher*, goes back to his past experience for suitable ideas, and reconstructs those selected in a form paralleling the story he is imitating. These are examples of what is properly called expression, and the principle of reconstruction is clearly traceable in each.

Again, suppose the pupil has to solve an arithmetical problem, such as: "I have a city lot 3.5 rods wide and 9.75 rods deep. What is it worth at the rate of \$10,000 an acre?" The solution of this problem may be regarded as an application of the pupil's knowledge of areas and multiplication of decimals. He goes about the task by applying the two principles involved to the data given in the problem, and, by means of the organization thus secured, arrives at the solution. Similarly, if he is required to parse the word "cleaning" in the sentence, "He earns a living by cleaning chimneys", he identifies the functions of the word with those of a noun object of a preposition and a verb taking an object. These functions, he knows, are parallel with those of the gerund, and he accordingly places the word in that class. In identifying the word, he is applying principles formerly learned, and is merely reconstructing old elements of experience.

It will be apparent to the reader that both expression and application are not merely tests to determine whether certain knowledge has been acquired by the pupil, but are rather a continuation of the learning process, by means of which he secures greater control over his knowledge and greater facility in the use of it through further reconstruction of experience.

EXERCISES IN EXPRESSION AND APPLICATION AS SEAT WORK IN SCHOOL

Much of the expression and application of what pupils have learned will of necessity be done as seat work. This is especially true of rural ungraded schools, where only a fraction of the teacher's time can be devoted to supervision of the learning processes of the pupils in each class. Even in the graded urban school, the teacher is well advised if he divides his class into at least two sections, and gives direct instruction to each alternately. As has been stated in another connection, the Department of Education expressly approves of this procedure, in the requirement that at least one-and-a-half hours of each school day shall be employed by each pupil in seat work. A much longer period than that is perforce required in the rural school where there are at least four or five classes.

This seat work is of such prime importance, both in the learning process and in the management of the school, that every teacher should give it the most careful study. A large proportion of the work taught in class will be completed by expression and application exercises given to the children to do at their seats. The teacher needs, therefore, to make in advance special preparation for the work that is given for expression and application; especially in primary classes, where

pupils are able to give sustained attention to a given task for only a short period, is it necessary to prepare a great variety of seat work. Difficulties in discipline, as well as slow progress in learning, are usually traceable to the lack of a sufficient variety and quantity of carefully planned and profitable seat work. It is safe to say that the success of a school, from the standpoints of efficient learning and of easy management, depends to a large extent upon the nature of the expressive exercises in the form of seat work provided for the pupils by the teacher. For junior pupils, therefore, the school should provide a great variety of objective materials for expression through the hand. In arithmetic, blocks, sticks, pennies, and other objects, may be used to illustrate number combinations. In primary reading, letter and word cards for word and sentence-building, and easy primers and story books for practice in reading, should be provided in sufficient quantities. For art, pencils, coloured crayons, and outline pictures, should be available. For handwork, a great deal of varied material should be furnished, such as plasticine for modelling, paper for folding and cutting, cardboard for constructive work, splints for stick-laying, blocks for building, etc. Young children take great delight in handling objective materials, and, if provided with suitable exercises for purposes of expression, will clarify and "stamp in" the impressions they have received during the teaching periods. The resourceful and ingenious teacher of junior classes will invent a great deal of concrete material for purposes of expression and application.

In senior classes much of the seat work will be in the form of language in the written reproduction of the materials covered in the class instruction in geography,

history, literature, nature study, etc. Oral and written composition are themselves matters of expression. The solution of problems in mathematics, the translation of sentences from a foreign language, map-making, drawing and colour work, sewing, etc., are useful, from the educational standpoint in upper classes, largely because they constitute valuable types of expression and application.

VALUE OF EXPRESSION AND APPLICATION

In nature study, history, and literature, the most valuable kind of expression of what is learned from school activities is that which comes through some modification of future conduct. This phase of the question will be discussed in some detail in connection with the development of emotional and volitional attitudes, in Chapter XXVII; and further consideration of the topic will be deferred till that chapter is reached.

Expression and application are most important, in that they test the clearness of the knowledge we have gained. We often think that our impression is clear, only to discover its vagueness when we attempt to express or apply it. People often say that they understand a fact thoroughly, but they cannot exactly express it in language. Such a statement is usually incorrect. If the impression were clear, the expression, under ordinary circumstances, would also be clear. In this connection a serious danger should be pointed out. Pupils sometimes express themselves in language with apparent clearness, when in reality they are merely repeating words that they have memorized and that are quite meaningless to them. The alert teacher can, however, by judicious questioning avoid being deceived in this regard.

Not only do expression and application test the clearness of the apprehended knowledge, but at the same time they give the knowledge greater clearness. We learn to know by doing. A pupil realizes a story more fully when he has reproduced it for somebody else. He images a scene described in a poem more clearly when he has drawn it. He has a clearer idea of the volume of a cord when he has actually measured out a cord of wood. He has a more accurate conception of the difficulties attending the discoveries of Sir Alexander Mackenzie when he has drawn a map and traced the routes of his expedition. There is much truth in the statement that one never fully knows some things until he has taught them to somebody else. The teacher in grammar and geography will often have occasion to realize this. Greater clearness of impression means, of course, greater permanence. We remember best those facts of which our impression was most vivid.

RELATION OF EXPRESSION TO IMPRESSION

On account of the close connection between knowledge and action, the law of expression has been formulated into a well-known pedagogical law of method—*no impression without expression*. Like many other educational maxims, however, this law may be interpreted in too wide a sense. The law of expression in education asserts only that valuable experiences, or valuable forms of new knowledge, should not be built up in the child's mind without adequate accompanying expression. Common experience shows that many impressions come to us which are never seized upon sufficiently by our consciousness to become intelligent guides to action. It is true that, so far as such impressions stimulate us, they tend towards expression, and to that extent the

maxim is true. For instance, when a child is impressed, say, by a sudden strange sound, he has a tendency to express himself by straining his attention, and when the man imagines an enemy is before him, he finds his arms and fists assuming a defensive attitude.

However, the child should early learn to form intelligent plans of action, and postpone or even condemn them as forms of expression. In other words, a child should learn to organize ideas into an orderly system, and hold their actual expression in abeyance till a suitable occasion arises. It would be a chaotic world, if, every time he received an impression, he rushed off to give it expression. Without the power to suppress or inhibit expressions, the child would be unable adequately to weigh and compare alternative courses of action, and suppress such as seem undesirable. Such, indeed, is the weakness of the man who possesses an impulsive nature; he acts upon the first idea that occurs to him, without reflection as to its probable consequences. Although it is true that all knowledge is intended to serve in meeting actual needs, or to function in the control of expression, it is equally true that not every organized experience should find immediate expression in action. Part, at least, of man's efficiency must consist in his ability to organize a new plan from old experiences in a purely intellectual way, and either postpone its execution till a suitable time, or condemn it as a mode of action.

While, therefore, we emphasize the importance, under ordinary conditions, of having the child's knowledge function as directly as possible in some form of actual expression, it is equally important to recognize that in actual life many organized plans should not immediately find expression in outer physical action. This being

the case, the divorce between organized experience, or knowledge, and practical expression, which at times appears in school work, is not necessarily unsound, since it tends to make the child proficient in separating the mental organizing of experience from its immediate expression, and must, therefore, tend to make him more capable of weighing plans before putting them into execution. This will, in turn, habituate the child to taking the necessary time for reflection between "the acting of a thing and the first purpose".

CHAPTER XXV

THE RECONSTRUCTION PROCESS IN THE ILLUSTRATIVE LESSONS

IN CHAPTER XVIII, five typical examples of school lessons were outlined in some detail. While we have frequently alluded to these in illustrating various topics in our recent discussions, we have, as yet, made no extended examination of them. The discussions of the various phases of the reconstruction process to which we have devoted the last three chapters will enable the student to examine these illustrations now with more understanding and appreciation of the principles of teaching that are involved. In the present chapter, therefore, it is proposed to analyse the lessons somewhat carefully, in order to show that in the development of these lessons there is a continuous process of reconstruction of the former experiences of the pupil. The student is advised to refresh his memory by re-reading the lessons outlined, in order that he may more intelligently follow the analysis.

NATURE STUDY—THE RABBIT

The various phases of the process of reconstruction are interwoven in such a complicated system in the study of the adaptations of the rabbit, that it will require close and clear thinking to disentangle them for purposes of examination. First, let us consider what is involved in the simple observations of the characteristics of the rabbit, for instance, that the animal has large eyes placed well to the side of the head. It is apparent that, in order to make this statement, the pupil must

have organized such old items of experience as eyes, large, place, side, head, into the relation expressed in the statement. Similarly, all the other observations of the rabbit's external features, for example, large mobile ears capable of being laid back flat along the neck; muscular hind legs stronger than the front legs; two pairs of chisel-like teeth in front, one pair in each jaw; short, thick fur next his skin; long hairs projecting over the short fur; white colour in winter, brown in summer; all these are nothing more than new organizations of elements of former experiences. It will be noted, further, that these reconstructions are concerned with materials supplied by sense-perception which are related in specific statements. When the child says, "The rabbit has soft, thick fur next to his skin", he has set up relations among his sense-perceptions, and the assertion of this relationship, as the student will remember, is a judgment.

In the case of the more complex forms of knowledge obtained, namely, the comprehension of the adaptations of the rabbit to its environment, the operation of the process of reconstruction is equally evident. By the exercise of sense-perception and judgment, the pupil organizes such items of information as, the rabbit is timid; he has no defensive weapon to aid him in attack; he has enemies such as foxes and dogs; he has to be outside to get his food in all sorts of weather.

From these rather simple judgments the pupil rises to more complicated judgments, such as: that in order to escape his enemies the rabbit must be able to see, hear, and run well; he must eat bark in the winter; he must have a coat that will protect him from the cold and keep him from getting wet to the skin. These latter judgments will be recognized as inferences, to obtain which the

pupil set up relations among other judgments. For example, his judgment that the rabbit must eat bark during the winter is based upon other judgments, namely, that the rabbit must have vegetable food, and that the only vegetable food available in the winter is the bark of trees and shrubs.

The pupil establishes further and more comprehensive relationships when he expresses judgments such as: the rabbit runs well because of his strong and muscular hind legs; he sees well because of his large eyes placed well to the side of his head; he hears well because of his large and movable ears; he secures his food easily because of two pairs of chisel-like teeth in front; he escapes observation because of his coloration; he keeps warm in the winter because of his coat of short, thick fur; he keeps dry in the rain because the long hairs of his coat shed the water. These judgments are the results of inferences organized through establishing relationships among antecedent judgments. The nature of these relationships may easily be perceived, if the judgments are thrown into the syllogistic form, as illustrated in Chapter XXIII. The following examples in addition to those quoted in that chapter may be given:

1. Large mobile ears enable an animal to hear well.
The rabbit has large mobile ears.
Therefore, the rabbit can hear well.
2. Chisel-like front teeth enable an animal to strip the bark from shrubs.
The rabbit has chisel-like front teeth.
Therefore, the rabbit is able to strip the bark from shrubs.

It will be observed that the third judgment of each series results from the establishment of a relationship

between the first two judgments. In other words, these inferences or deductions arise from the reconstruction of judgments.

In this analysis of the study of the rabbit, the student will note, (1) that the basic materials are sense-perceptions, (2) that these sense-perceptions are related and organized into judgments, and (3) that these judgments are in turn related and organized into a higher order of judgments resulting from deduction or inference. The process of reconstruction thus occurs largely on two planes of thought—judgment and reasoning.

GEOGRAPHY—THE CITY OF OTTAWA

It will be observed that this lesson falls into several parts, in each of which the process of reconstruction will be readily traced. The phases of the thought process that are predominant are judgment and deductive reasoning. In fact, the lesson may be set forth in a series of judgments and inferences based upon previously experienced sense-perceptions, concepts, and inductions.

We shall illustrate the latter statement first. There are used in the course of the lesson many general ideas which have come from the previous generalization of known particulars. For instance, there is the general idea that towns with extensive manufactures of pulp and paper are usually located on a river at a point where power is available. How did the pupil obtain this idea? He has noted that places like Fort Frances, Hawkesbury, Sturgeon Falls, Iroquois Falls, Kapuskasing, Espanola, and Sault Ste. Marie, have pulp and paper-mills, that they are located on rivers, and that they have electric power at hand or easily available. From these particular cases he has obtained his general law through induction.

This is typical of the development of the general laws used throughout the lesson.

Coming now to the processes of reconstruction appearing in the lesson, we shall consider a few characteristic examples.

1. The pupil has possession of the general law that the conditions of the lumber, pulp, and paper industries are water-power, rivers for the transportation of logs, and a wooded region not too far away. He knows that Ottawa has these conditions, and he applies this law to the explanation of the existence of the lumber, pulp, and paper industries there. This will be recognized as an example of deduction, which the student already knows is a product of the reconstruction of experience.

2. The pupil knows from former inductive processes the conditions that make a place a railway centre, namely, a great deal of merchandise and manufactured products to be shipped out and in, and perhaps the selection of the place by the railway authorities as a divisional or terminal point. He observes that Ottawa fulfils these conditions, and thus explains why it has become a railway centre. This is another deduction or inference.

3. The pupil has a knowledge of the requirements of a large business concern—a large staff of officials, office clerks, salesmen, workmen, etc. From this knowledge he will be able to infer the requirements of a capital city where the business of the country is carried on. Thus he gets a conception of a great government organization—a large number of government departments, each having charge of a tremendous volume of business, a civil service of thousands of departmental officials, clerks, stenographers, typists, etc. The pupil is prepared

to ascribe a great deal of the growth of Ottawa to these conditions. Here is quite evidently still another illustration of deduction.

A similar procedure is followed in explaining why Ottawa has become a centre for the manufacture of furniture, doors and sash, and dressed lumber, for the manufacture of cement, and for the wholesale trade. The pupil recalls from his old experience the requirements for each of these, and shows that Ottawa fulfils these requirements. Thus, by a process of deduction, he explains why Ottawa has these manufactures and a whole-sale trade.

Thus, throughout the lesson, we observe the continuous process of reconstruction of ideas into simple judgments, and of simple judgments into more complex judgments through a process of deduction. The meaning given by the pupil to each topic depends upon his organization of his old experiences into new forms. It may be objected that some of the ideas said to be recalled from the pupil's former experience are really not in his experience at all. This can be only partially true. For instance, he may not know that the Ottawa and its tributaries drain a region wooded with pine and spruce, or that water-power is available where the city stands. But, if the pupil is *told* these facts, he will give them meaning by reconstructing suitable antecedent experiences, and they will thus become available for use in the organization of more comprehensive knowledge. Of course, if the pupil has to be told many of these essential facts, it would be better to postpone the teaching of such material until he has organized most of them from his prior experience. The point that stands out clearly is that the pupil understands, or gives a meaning to, the new experiences only as he recalls relevant and

suitable elements of former knowledge and combines these in new relationships.

LITERATURE—THE SOLITARY REAPER

The extent to which a pupil comprehends and appreciates this poem will depend entirely upon the richness of his past experience. If, for instance, he has no first-hand knowledge of the operations involved in harvesting, if he has never heard a haunting melody sung by a beautiful voice, if he has never listened with pleasure to the songs of the birds, if he has had no experience of sorrow or suffering, if he has had little opportunity to perceive the music of words, his understanding and appreciation of the poem will be meagre indeed. If, on the other hand, he has had a fairly wide experience in these fields, the poem will be to him a thing of beauty both in form and content.

The processes of reconstruction that must occur in the pupil's mind in the course of the study of the poem are so numerous and complicated that it would be impossible in a limited space to trace them out with any completeness. The most that can be attempted here is to analyse a few of the typical examples, leaving the reader to make a further analysis at his leisure.

The first rapid reading of the poem by the pupil will arouse the recall of only a few past experiences, and the organization of these into a vague idea of what it is about. For instance, he may formulate his idea something like this: "The poet hears a girl singing as she works; her voice is very sweet; the poet does not know what she is singing, but he remembers the music long afterwards". At this stage of the discussion, the reader will at once perceive that this vague idea of the meaning of the poem is an organization of simpler elements of old experience.

Each word is a symbol of a former idea; these ideas are reconstructed into the more comprehensive idea expressed in the pupil's statement.

The pupil is next required to look more deeply into the poem to get out of it as much as he can. This means that he must bring forward such past experiences as are suggested by the words of the poem, and must organize these into an interpretation of its meaning. This organization of recalled ideas will usually take one of two forms, namely, images or inferences. A few examples of each of these will be selected for analysis, and these will serve as illustrations of what takes place throughout the whole study of the poem.

In response to the teacher's questions, the pupil builds up from the first stanza a picture such as the following: "The poet sees a Highland girl reaping with a sickle in a field. She is alone, and she sings a melancholy song. Her voice is very clear, and the whole valley seems to be filled with the music". It is evident that this image has been constructed out of elements of old experience. Unfamiliar items, like "sickle", will be given a meaning from pictures or from familiar ideas, such as scythe or knife.

In the second stanza, two other images are similarly constructed:

1. The travellers in the Arabian desert, after a toilsome day's journey across the hot sands, rest at night at an oasis, and listen with delight to the song of the nightingale.

2. The people of the Hebrides hail with delight the arrival of the cuckoo, which heralds the long-delayed spring.

The pupil may never have heard either the nightingale or the cuckoo, but, if he substitutes birds with which he is familiar, his image will suffer but little loss. His ideas of Arabian sands and of the Hebrides will be built from pictures or verbal descriptions, which are themselves interpreted by the organization of old experiences. And similarly, with other images which are suggested by other passages in the poem, and which may be located by the reader himself.

So much for images; now as to inferences. In the first stanza, the pupil is asked to point out the expressions that show that the Highland girl had no companions in her work. His reply requires the recall of old experiences (his knowledge of the meanings of words) and the establishment of relationships (the perception of the similarity in meaning between *single*, *solitary*, *by herself*, and *alone*, on the one hand, and *lack of companionship*, on the other). When he is further asked why the poet uses so many similar expressions to convey his idea, the pupil's answer will be an inference. He sets up a relationship between his general idea that repetition gives emphasis and the particular repetitions in the stanza, and infers that the poet uses several expressions conveying the same idea, in order to emphasize the idea of solitude, and thus to explain in part the effect of the song.

Again, when the pupil says that the commands, "Behold her," "Stop here, or gently pass," "O listen," are addressed to the reader, he is making another inference. He is applying the general law that, when the imperative sentence is used, somebody is being addressed, to explain the use of the imperative forms in the stanza. Still further, he makes a more difficult inference when he says that the poet addresses the reader in order that the latter

may more vividly picture the scene. He sets up a relationship between vividness of picture and actual participation in the scene. He thus infers that the poet makes the picture vivid to the reader by making him imagine he is a participant in the experience.

Once more, when the pupil is asked to explain why the poet asks the question at the beginning of the third stanza, "Will no one tell me what she sings"? his answer will probably be one of several possible inferences. Perhaps the girl is too far away for the poet to hear. It is often difficult to distinguish the words of a singer. The changing position of the girl at her work might make it hard for a listener to catch the words. These inferences will be discarded as unsatisfactory when the pupil is asked in what language the Highland girl would sing. The correct inference would then be made. The pupil selects the two ideas, "The song is in Gaelic", and, "Wordsworth is unfamiliar with that language". He sets up the relationship between these two ideas, namely, "Therefore, Wordsworth does not understand the song".

As has been already intimated, the formation of the images and inferences referred to above is typical of what occurs continuously in the pupil's mind during the study of the poem. Similar processes of reconstruction to those involved in the organization of the ideas described should be traced out by the student in other parts of the poem.

ARITHMETIC—DIVISION OF DECIMALS

In establishing the two laws upon which the learning process in this example depends, the processes of reconstruction will be easily apparent. In multiplying decimals by 10, the pupil recalls his old knowledge of the multiplication table and of the rule for placing the point

in multiplying decimals. In the first example, he observes that the digits of the product are the same as in the multiplicand, but that the decimal point has been moved one place to the right. He probably wonders if he has discovered the rule for multiplying by 10. The second example makes him a little more certain that he is on the right track. By the time he has done four or five examples, he is sure that a decimal is multiplied by 10 by moving the point one place to the right. In other words, he has formulated a rule by perceiving the likeness or relationship among the various examples considered. The rules for multiplying by the various powers of 10 are obtained in a similar manner.

The second law, that multiplying the dividend and divisor by the same number does not change the quotient, is secured in exactly the same way. The pupil uses his knowledge of the various combinations in the multiplication table. Very early during the consideration of the various examples, the pupil secures an inkling of the general law. Each successive example strengthens his belief, until at length he is certain that he has possession of the law. In this process he has merely grasped the relationship running through the various examples.

In the establishment of these two rules, the pupil has proceeded by an *inductive* thinking process, a special form of the reconstructing activity, which, it will be remembered, was considered in Chapter XXIII.

The main part of the learning process, in the present instance, lies in the application of these two laws in the solution of specific examples of the division of one decimal by another. When asked how to convert the division of the first example to be solved ($.0234 \div .6$) into a whole number, the pupil sets up a relation between the rule he has learned and this specific divisor. When asked

further, "If this divisor is multiplied by 10, by what must the dividend also be multiplied?" he perceives a relation between the second rule and the problem to be solved—an example of the deductive thinking process.

When later, the pupil formulates the rule for dividing one decimal by another, he is again proceeding inductively. This means that among the examples he has solved, he perceives a similarity of method. He grasps the thread of unity which binds them together, which the reader will realize is the familiar reconstruction process once more. And when still later he applies the rule in the solution of further problems involving the division of decimals, he is again proceeding deductively.

THE TAPER-SHANK TWIST DRILL

This lesson is an excellent example of a teaching procedure requiring the exercise of sense-perception, judgment, and deduction. The basis of the judgments and deductions are to a large extent sense-perceptions. Through the senses, the pupil gets impressions of the shape, hardness, sharpness, etc., of the drill. These impressions, as explained elsewhere, involve, not merely sensory qualities, but also certain products of past experience which constitute them percepts.

Throughout the lesson the pupil is called upon to express many judgments, which, as the reader will recall, are merely statements of relations between mental facts, principally percepts and concepts. The following examples of judgments are typical of those made by the student:

The drill is made of round stock.

The drill is made of hard steel.

The circumference is greater at the lips than at the shank.

The lips are of the same length.

The lips are at an angle of 59 degrees to the main axis of the drill.

An analysis of each of these judgments will show that the student has merely reconstructed certain elements of his experience. For instance, in the case of the first, he has set up a relationship among the ideas, drill, made, round, stock, which are all items of former experience. Or to state this in another way, he has set up a relationship between his percept, "the drill", and his concept, "made of round stock". So also, in the judgment, the lips are at an angle of 59 degrees to the main axis of the drill, a rather elaborate relationship of many items has been set up. The student can enumerate these for himself. To express it briefly, the pupil has set up a relationship between his percept, "the lips", and his idea, "at an angle of 59 degrees to the axis". Similarly with the other judgments; the student may test his knowledge of the reconstruction process by an analysis of each in this way.

In like manner, the inferences made by the pupil throughout the lesson may be shown to be examples of reconstruction of former experiences. It will be noted that the teacher, during the lesson, frequently asks such questions as, "Why"? or, "How do you know this?" In each case the pupil's response is a deduction or an inference. From the discussion in Chapter XXIII the student will recall that an inference is made when the pupil uses a general law to explain a particular fact. Thus, when a pupil says that the web of the drill is thickest near the shank because the strain is greatest at that point, he bases his judgment on the law that great strain requires thickness of material to sustain it. He has set up a relationship between this known

principle and his particular judgment that the drill has great strain exerted at the point just below the shank. In other words, to make this inference, he has reconstructed his experience.

The student will find it interesting and profitable to examine other examples of inference in this lesson, in order to assure himself that the principle of reconstruction is in operation in every case. The analysis will be easier if the inferences are thrown into the stereotyped form of the syllogism, as was done in Chapter XXIII. For instance, the pupil's thinking when he is asked the question, "Why does the body of the drill taper slightly towards the shank?" may be set down in a formal way as follows:

Body clearance can be given only by tapering the drill from the lips to the shank.

This drill needs body clearance.

Therefore, this drill tapers from the lips to the shank.

So, also, the pupil's thinking in response to the question, "Why should the lips of the drill be cut back at an angle?" may be thrown into the syllogistic form thus:

Clearance when cutting requires that the lips be cut back at an angle.

This drill requires clearance when cutting.

Therefore, this drill has its lips cut back at an angle.

It will be observed from these examples that the pupil arrives at his final judgment by establishing a relation between a general law and a particular judgment. It will, of course, not be necessary to remind the student again that the pupil does not actually carry on his thinking in the form of the syllogism, but that this is

merely a convenient way of stating his reasoning for purposes of analysis.

The somewhat minute and protracted analysis of the learning process, as exemplified in the five examples outlined in Chapter XVIII, will be sufficient to ensure a clear understanding of the mechanism of that phase of the learning process which involves the acquisition of knowledge. The reader is advised, however, to analyse in a similar manner some other instances of learning, in order to assure himself that he can without difficulty trace out the activities involved.

CHAPTER XXVI

HISTORICAL BACKGROUND OF CLASSROOM PROCEDURE

THROUGHOUT several foregoing chapters, we have been endeavouring to find a form of procedure in teaching that will be universal in its application. We have recognized that any teaching procedure must harmonize with the activities involved in the learning process, that, in fact, teaching is nothing more than the provision of conditions whereby the learning process may most effectively be facilitated. We have found, that as an essential of learning, the child must be stimulated by a motive, that is, by some problem which develops out of a situation requiring action. The consciousness of the need of solving this problem throws him back upon his old experience for possible means of solution. This solution is attained by the reconstruction of elements of past experience, and is carried into effect in action. Thus we may say that there are but two principles involved in learning, namely, motivation and reconstruction. In fact, we may combine these, and say that the principle of the learning process is *effectively-motivated reconstruction of experience*. The universal procedure in teaching which we have discovered will, therefore, consist in finding motives which will induce the pupil to reconstruct or reorganize his experiences in such a way that he will obtain control over the social inheritance as represented by the various subjects of the school curriculum. The effective application of this principle in teaching will tax all the knowledge, skill,

and ingenuity, that the teacher possesses. It will make his teaching a rational process based upon clearly understood principles of mental activity, and not a mechanical procedure based upon a blind imitation of stereotyped devices or methods.

The attention which has, in recent years, been given to the principle of reconstruction is due largely to the emphasis placed upon it by Professor John Dewey, an American educationist and author. He has developed and amplified the principle in several of his works, but perhaps it has received its most comprehensive expression in his *Democracy and Education*.

Certain "methods of teaching", "lesson types", and "formal steps" have been advocated in the past, largely because educationists have recognized only one phase of the reconstruction process, and have emphasized it to the exclusion of the others. This statement may be illustrated by a brief reference to certain educational movements of the past.

THE PESTALOZZIAN MOVEMENT

The pioneer of the modern psychological movement in education was Pestalozzi, a Swiss author and teacher, (1746-1826). His fundamental principle was the development of the child's powers, not the communication of knowledge, which had been the traditional purpose of the school before his time. We owe to Pestalozzi and his disciples the famous definition of education, the harmonious development of all the powers of mind and body, discussed in Chapter III. The basis of the education he gave his pupils was a training in sense-perception correlated with the use of language. He chose the subject-matter of education largely from the child's environment. In our present-day practice of motivating

school work by approaching the child's mind through the presentation of concrete materials and through opportunity for direct participation in the activities of the environment, there is an acknowledgment that Pestalozzi was right in the emphasis he laid upon sense-perception as the basis of knowledge. It is apparent, however, that in doing so he was emphasizing only one phase of the reconstruction process.

THE HERBARTIAN MOVEMENT

The first educationist to make a serious attempt to place the art of teaching on a scientific basis was Herbart, a German philosopher and educationist (1776-1841). One of Herbart's chief contributions to pedagogy is the doctrine of apperception, by which he meant the interpretation of new ideas by means of old. Here is the germ of the reconstruction theory. However, Herbart and his followers apparently regarded learning, or apperception, as consisting in setting up relations between *new* ideas presented to the mind, and *old* ideas already possessed by the mind. The reconstruction theory, as we have explained, consists in setting up relations among old elements of experience in order to constitute a new experience. In other words, the relations are not between the old experiences and the new, but among the old experiences in order to create the new.

An important feature of Herbart's scheme of instruction was his endeavour to systematize classroom procedures through a proper sequence of presenting subject-matter. The presentation had to take place in such a way that the inter-connections between the old (things previously learned) and the new (things about to be learned) were absolutely assured. This led him quite naturally and inevitably into a formal, uniform class-

room procedure, which he regarded as applicable in all cases and under all conditions. He divided the process into four stages, which he designated respectively, Clearness, Association, System, Method. Though there may be some doubt regarding the exact meaning which Herbart attached to each of these terms, nevertheless their historical significance lies in the fact that they formed the basis out of which his disciples evolved the so-called "five formal steps of the recitation". The most commonly accepted statement of these five formal steps is as follows:

1. *Preparation*—A review of the old ideas that are related to the new ideas to be presented.
Sub-step—Problem or Aim—Statement of the work to be done.
2. *Presentation*—The presentation and examination of the particular examples illustrating the new concept, rule, or principle, to be taught.
3. *Comparison and Abstraction*—The detection of the points of similarity and difference in the particular examples analysed in the preceding step, and the abstraction of the reliable data upon which the generalization must be based.
4. *Generalization*—The apprehension of the general law underlying the particular examples.
5. *Application*—The explanation of further particular facts by means of the general law thus apprehended.

Without entering upon any elaborate criticism of these "formal steps", it may be pointed out that they contemplated only an inductive-deductive method of procedure. Though induction and deduction are usually present in our learning activities, it is apparent that all

learning activities cannot be fitted into the steps or stages outlined above. In fact, it is impossible to reduce even the most formal of our inductive and deductive thought processes to such rigid and inflexible forms. As was shown in Chapter XXIII, induction proceeds in a different manner from that described in the second, third, and fourth steps of this formal procedure. In actual thinking, these steps are not successive, but concurrent, stages of our thought processes. They are interwoven with each other in the most subtle and intricate ways. Moreover, as we have already shown, neither of the so-called preparation and application steps is a separate part of the apperceptive or reconstruction process. Consequently, though the disciples of Herbart greatly improved his technique of classroom procedure, they were open to criticism on the score of rigidity and formality.

Educators soon realized that these "five formal steps" were applicable only in a limited field—inductive and deductive studies—and even there only when considerably modified and re-interpreted. They perceived, too, the insufficiency of this technique in taking care of all the learning activities of the school. The formation of habits, the organization of large masses of facts, the obtaining of information, and the development of appreciation all have their place. So they extended these classroom procedures beyond the original inductive-deductive development lessons to include, (1) drill lessons, (2) review lessons, (3) information lessons, (4) appreciation lessons, (5) supervised study lessons. However, they made the mistake of regarding these lessons as isolated entities. Each was so exclusive in its purpose and in its procedure that it had few interrelations with the other types of lessons. Consequently, though the recognition that the activities of the classroom are many and

varied rather than single and uniform represents a real advancement in the art of teaching, nevertheless, classroom procedures were still left on a mechanical and inflexible level.

In recent years, scientific research has done much to eradicate some of the above defects. Much still remains to be done. The clear-cut recognition that the essential characteristics of method are identical with the essential characteristics of clear thinking has had a very decided influence on classroom technique. It means that our standards of classroom procedure are to be found in the normal natural thought processes of the individual who is successfully working his way through some purposeful pursuit. These have been analysed and illustrated in several foregoing chapters. They have given us as the essentials of classroom technique just two activities—(1) motivation, (2) reconstruction of experience.

The constant interplay of various mental activities—sense-perception, habit, imagination, conception, judgment, reasoning, etc.—in all learning processes, suggests that seldom, if ever, can any classroom activity be confined within the narrow limits of a single “lesson type”. Classroom experience gives abundant evidence every day that the learning process constantly demands an interweaving of all the activities involved in so-called “lesson types”. For instance, the mastery of the single knowledge unit how to divide one decimal by another (Chapter XVIII) requires review, drill, induction, and deduction. We recognize, to-day, that no single learning activity belongs to any exclusive type, but that it always involves a constant interplay of many varied processes. Consequently, though we still retain the terms induction, deduction, appreciation,

review, drill, supervised study, and recitation, in designating processes in learning, we do not attempt to "pigeon-hole" any learning activity under any exclusive label. It may, at times, be convenient to call a particular learning activity a drill, because that process seems to predominate in the learning, but it will be understood that the term is applied with reserve, and that there will be other activities involved. This will relieve the teaching process of much of the formality from which it has suffered through Herbartian influence.

THE FROEBELIAN MOVEMENT

Another German educationist whose principles are largely in harmony with the theory we have presented was Froebel (1782-1852). He laid emphasis upon the self-activity of the child as the basis of learning. By self-activity he meant the spontaneous effort that the child puts forth because of the inherent interest that the subject-matter has for him. Froebel thus made the child's natural interests the starting-point in instruction. This principle determined the means he advocated in teaching the child—play, constructive work, and nature study. He endeavoured to have the things learned function directly in activity, thus giving education a social and practical significance. It is evident that Froebel, in his doctrine of self-activity, has emphasized the idea of motivation which occupies so large a place in our theory of learning. In his insistence on the practical and social values of the subject-matter of learning, he has also emphasized the expression and application phases of the doctrine of reconstruction.

THE PROJECT MOVEMENT

That the so-called laboratory school (Dalton) method and project method are open to the criticism that

they emphasize one phase of the reconstruction activity to the exclusion of other phases will be evident to anyone who has read carefully the sections of this Manual that deal with these topics. The greatest merit of these "methods" lies in the intense motivation and consequent sustained and persistent effort which they secure. But the fact that they emphasize the motivation phase of the reconstruction process does not constitute them as new and revolutionary methods of procedure. We may appreciate them as highly successful devices in teaching, while recognizing that they do not involve any essential element which is not contained in the reconstruction activity.

CHAPTER XXVII

TEACHING AND THE DEVELOPMENT OF ATTITUDES

SOME TIME ago, the following striking sentence appeared on the editorial page of a great daily newspaper:

“The desperadoes and thieves of to-day were school boys ten years ago, and if society is ever to find complete protection against such offenders, it will probably be through the schools.”

This statement carries a serious charge against our schools, and at the same time conveys a splendid tribute to their influence. It suggests in the first place that the existence of a criminal class may in some measure be due to the delinquency of the school. It implies that there are criminals because the school did not have an opportunity to exert its influence during their childhood, or because other factors in the environment, evil in their character, offset its influence, or because it failed to take advantage of its opportunity to create those attitudes which tend to develop honest, industrious, and law-abiding members of society. For only the last of these three possibilities can the school properly be held responsible. It behoves the school, therefore, to look carefully to itself to discover wherein it has been remiss in this regard.

But it is important, also, to notice the tribute which the statement quoted pays to the influence of the school and of the teacher. The implication is that, to a very great extent, the future safety and welfare of society depend upon the school; in other words, that the school is the greatest moral agent in the world to-day. Unfortunately, it is too often regarded merely as a place

where young children acquire a certain skill in language, reading, writing, and number, and a certain knowledge of geographical, historical, and scientific facts—a skill and a knowledge that are supposed to be useful in helping the individual to make his way in, or sometimes against, the world. If this were all the school accomplished in the life of the nation, it would fall far short of the complete achievement of the purpose for which it is designed. This narrow conception of its purpose has led some teachers to view their responsibilities lightly. What teachers need most is not higher scholarship, not better technique in instruction, not greater skill in management, but a keener perception of their function in moulding the life of the nation, and a more intense desire and stronger determination to discharge that function fully and efficiently.

In what does this function consist? The answer has been partially given in the preceding chapters. In the discussion of the teaching process thus far, it has been shown that the teacher has two duties, (1) to establish in the pupils desirable habits and useful skills, and (2) to give the pupils control of the social inheritance in the form of usable knowledge. The third, and by no means least important phase of the function of the teacher still remains to be considered, namely, the development in the pupils of proper emotional and volitional attitudes.

A man who employs boys during the holiday season has expressed himself thus:

“I do not care so much what a boy knows, or what he can do, though these are, of course, important things. I am concerned chiefly about his attitude towards the important things in life, towards work and duty, and things of true worth. If, for instance, he cannot be trusted to do his work as well as he can without being

watched, it matters little how much knowledge and skill he has; he is of little use to me or to society at large."

In making this statement, the speaker has laid emphasis upon a very important phase of the question of attitudes. In passing, it might be remarked that it is an unhappy commentary upon human nature that so much time, energy, and money are spent upon the supervision of work which, if the attitude of the worker were ideal, would be unnecessary. It is estimated that from one-quarter to one-third of the cost of labour is paid for supervision, not merely in planning and directing work, but largely in seeing that men do their work without slacking. These conditions show the necessity for the cultivation of proper attitudes in the young. These attitudes must be created in order to prevent not only the neglect of things that ought to be done, but also the doing of things that ought not to be done, to which reference was made in the earlier part of this chapter. In other words, proper emotional and volitional attitudes will obviate sins of omission as well as sins of commission.

The importance of attitudes and the principles underlying their development were discussed at some length in Chapter X. A brief re-statement may be desirable at this point. It was shown that one's value as a member of the social organism is determined largely by his attitudes towards other members of the community, towards the activities of the environment, and towards things of worth in the social inheritance. However great may be the individual's knowledge and skill, these alone are incomplete and of little value without proper emotional and volitional attitudes. It was pointed out also, that, as the knowing, feeling, and willing phases of human activity are inseparable, the development of right ideas

will ordinarily ensure the concurrent existence of right feelings and right choices. Further, the contagious nature of emotion was indicated. And, finally, the fundamental law of volitional development was stated to be the inculcation of ideals, that is, the development of ideas strongly tinged with emotional qualities which determine choice and conduct. Throughout the whole discussion, the general principle of development was emphasized—the occurrence of a situation within which appears a problem the solution of which demands the reconstruction of old experiences into a plan or organization with such an emotional content that right action is stimulated.

In our present discussion of the development of emotional and volitional attitudes through the teaching processes of the school, the application of the same principles will readily be traced. Situations in connection with school activities will have to be found, calling forth responses that will tend to the development of useful attitudes. A survey of the field of opportunity for this purpose shows that there are at least four important avenues by which to approach the cultivation of desirable tendencies in feeling and conduct. These avenues of approach are—(1) the teacher's personality, (2) association of the pupils with each other in the classroom and the playground, (3) the management of the school, and (4) the courses of study. The first two may be regarded as informal means of approach, operating as they do in a more or less casual way and without conscious design. The last two may be designated as formal means, since they have in view the explicit purpose of influencing the child in definite directions. Each will be considered briefly in the order named.

THE TEACHER'S PERSONALITY

It is a well-recognized fact in education that young children are ardent hero-worshippers. To them the teacher is the embodiment of all virtue and wisdom. He is accepted as the supreme authority in all matters of knowledge; in comparison with his judgment, both father's and mother's are inferior and unreliable. The pupils admire and imitate his manner, personal habits, forms of speech, and handwriting. Every teacher should realize this, and should appreciate what a powerful influence in moulding the attitudes of children for good or ill he wields through his personality. His interests, enthusiasms, and attitudes, exhibited perhaps unconsciously, will be caught by the pupils through the principle of suggestion and the tendency to imitate. A casual, unpremeditated word or action in the classroom or playground may have far-reaching consequences in determining the pupil's outlook on the things of life. Perhaps one of the most pleasant experiences that a teacher ever has is to have his former pupils, long after they have left the school, come to him and say, as many of them do, "I don't remember very much of the school subjects you taught me, but I do remember that you led me to admire what is good in literature and art, to be honest and thorough in my work, and to scorn unfairness in play". Attitudes of this kind are usually developed, not through specific teaching, but through the general atmosphere of the classroom or the playground permeated by the personality of the teacher.

ASSOCIATION WITH OTHER PUPILS

The social contacts of pupils with one another in various school activities are a fruitful source of desirable attitudes. Certain pupils are naturally strong in initiative,

and their leadership is, by common consent, acknowledged by their companions. Happy is that school whose recognized leaders have tendencies in right directions, for their influence on public opinion in their little domain is likely to be paramount.

The wise teacher, through tactful suggestion, can turn these childish social contacts to good effect. He can influence children to be appreciative of the good work of others, to be sorry for their failure or disappointment, and to co-operate happily and agreeably in a common task. Even the competitive spirit, inevitable in all schools, can be relieved of any tinge of envy, malice, or uncharitableness.

But it is on the playground that the most valuable opportunities are afforded for the development of attitudes through association. Organized games, especially if under the unobtrusive supervision of a teacher who realizes their possibilities, are particularly valuable for this purpose. Properly directed, they lend themselves to the establishment of some of the finest qualities of citizenship. First, there is the attitude of obedience to authority, which comes from the rigid observance of the rules of the game and the unquestioning acceptance of the decisions of the umpire or referee. Secondly, there is the spirit of fairness and generosity towards an opponent, which a well-played game ought to engender. So generally is this feature of games recognized that the phrase, "That is not 'cricket' ", has become the proverbial way of condemning any unfairness or ungenerosity in conduct in other relations of life. Fair play is often sadly lacking in the games of children, and in fact, of older people as well. It reveals itself sometimes in the offensive partisanship shown in the applause of the play of the home team, in the jeers which too often greet the play

of opponents, and in the insults hurled against the umpire who gives an unfavourable though just decision. Children may be taught by the tactful teacher to be generously appreciative of an antagonist's play, and to accept gracefully an adverse decision even though it is believed to be wrong. Thirdly, the playground develops a spirit of team-play, an attitude of co-operation for a common purpose, and a tendency to subordinate personal interests to the welfare of the side. The feeling and volitional attitudes developed on the playground can scarcely fail to be carried over into the serious pursuits of life.

THE MANAGEMENT OF THE SCHOOL

A third opportunity to influence the attitudes of pupils comes through the management of the school. Here experiences are given for the definite purpose of developing specific capacities of industry, persistence, honesty, and self-control. To train the child to attack difficulties courageously, to hold himself steadfastly to the accomplishment of his work in spite of distractions, to avoid cheating and copying, to conduct himself well when the teacher is absent, is to inculcate an ideal of self-control, and no more valuable moral equipment can be developed. The actual practice of a school principal in his effort to secure this quality of self-control in his pupils will illustrate a successful method of procedure for this purpose. When this teacher received a new class at the opening of the school, it was his custom early in the first week to assign the pupils an exercise, and then leave the room for several minutes. When he returned, he usually found what he anticipated—an idle class in considerable disorder. This was the situation he desired. In a quiet talk to the pupils, he told them that he wished

to be able to trust them, that he expected them to be sufficiently honourable and trustworthy not to take advantage of his absence to create disorder, and that he wanted to be able to leave the room with full confidence that they would conduct themselves while he was absent just as they would while he was present. Were they willing to undertake to do this? Everybody was willing. This teacher developed in his pupils a desire for self-control, and seldom was the confidence he reposed in them violated. In a similar way, he succeeded in creating a general attitude in favour of honesty and straightforwardness and against all forms of cheating and copying. The principle underlying the plan was the establishment of a desirable feeling attitude, which worked itself out in conduct of a corresponding kind when a suitable situation presented itself. Experiments in school discipline have shown that excellent results may be secured by throwing the responsibility for the government of the school largely upon the pupils themselves. The success of such a venture depends upon the creation of desirable attitudes in the whole student body, usually through the influence of principals and teachers of strong personality.

THE COURSE OF STUDY

The most fruitful opportunity for the cultivation of desirable attitudes comes through the medium of the course of study and the lessons of the classroom. The teacher's technique—his skill in the presentation of the lesson facts—has an important bearing upon the attitudes of the pupils. The orderly progress throughout the lesson, the clear and logical procedure step by step, the unfailing realization of the purpose with which it started, the resolute refusal to be turned aside from the attainment of the end into more interesting by-paths—these

at least are qualities of lesson technique which cannot fail to have a reflex effect upon the child's ideals. He develops ideas of the value of thoroughness and accuracy, of success and achievement, of courage in attack and persistence in effort. These ideals will persist beyond the period of school education, and, in all probability, will later develop into similar habits in the serious pursuits of later life.

Even more important than the technique of the lesson, in the development of desirable attitudes and the formation of character, is the content of the lesson. Every subject of the school curriculum has its particular ethical values. Space does not permit a full discussion of all of these, but a few specific instances may be noted.

Foremost among school subjects in ethical value stand history and literature. Here, more than in any other place except possibly in real life, boys and girls find their ideals and their heroes. The skilful presentation of these subjects by the teacher who has a clear realization of their possibilities is almost certain to arouse appreciation of what is good and an aversion to what is bad in character and conduct. The difficulty is not in developing appreciation, but rather in having these carried over into action and conduct. In other words, it is easy enough to create emotional attitudes, but more difficult to have these function volitionally. For instance, it profits a child little to have his feelings of aversion stirred against the actions of King John, if he is not considerate of the rights of others on the playground. He has gained little from his admiration of Robert Bruce, Columbus, or La Salle, if he does not courageously attack difficulties and persist in his efforts till he has overcome them. He has his sympathies stirred to small purpose in his reading of *A Christmas Carol* if he does not act more

considerately towards those less fortunate than himself. Indeed, it is to be feared that the constant stirring of emotions without any expression in practical conduct has a tendency to weaken rather than strengthen the moral nature. To have generous feelings continually aroused and never to act in a generous way, to have one's sympathies frequently stirred and never to do a kindly deed, to have feelings of affection and never to perform an act of service, is to cultivate a weakness of character. A familiar instance is that of the lady who wept copiously over the imaginary sorrows of the heroine in the play, while her coachman was freezing to death outside the theatre. If worthy emotions are ever to be of the slightest moral value to the individual, they must be carried over into the field of action.

This then is one of the problems of the school. The opportunity for the awakening of appreciation, admiration, and other desirable feelings, is unlimited; the opportunity for expressing these in conduct, in the school at least, is meagre. Occasionally, it is true, there are situations where they may find expression, but for the most part we must rely upon the establishment of the proper feeling attitudes through school activities, and trust that the ideals will function in right choices of worthy modes of action later in the larger life outside the school.

There are, of course, other appreciations to be developed besides those of character and conduct. In literature, for instance, there is the appreciation of artistic expression, of musical qualities of language, of beauty and clearness of description, of skilful organization of plot, all of which may be expected to function in the pupil's choice of his reading matter and in his own literary expression. In history, there is the appreciation of the

rights and privileges we possess as citizens, through the wise efforts of statesmen of the past and present, and appreciation, too, of the comforts and conveniences we enjoy, through the struggle and sacrifice of the pioneers who laid the foundation of our country. These appreciations can perhaps be best expressed in adequately exercising our civic functions, in honouring the memories of those to whom we owe our liberties, and in respecting those who to-day in various fields are labouring to make our lives happier and more comfortable.

Space will permit only a brief reference to a few other desirable attitudes which may be established as ideals in the lives of children through other school studies. In mathematics and science, the pupil learns to appreciate the value of accurate statement, of clear and logical thinking, of care in the examination of data, and of caution in arriving at conclusions. Attitudes of this kind are likely to be carried over into the affairs of practical life, and to function in the establishment of useful habits. In the study of nature, the pupil can scarcely fail to appreciate the wonderful adaptation of form and life, of means and end, as exhibited in the objects and phenomena of the natural world, and at the same time to cultivate a love and admiration for the things of nature and a reverence for the designer and creator of this harmonious world. Similarly, the study of art should develop an appreciation of beauty of form and colour, which may express itself in a practical way in such activities as furnishing a room or making a garden.

If anything has been emphasized in this discussion, it is the uselessness of mere knowledge unless accompanied by desirable feeling attitudes, culminating in right choices and worthy conduct. In other words, the real value of knowledge consists in the kind of appreciations and ideals,

and, ultimately, in the kind of moral behaviour to which it leads. The individual's contribution to the welfare of society will depend in large measure upon the character of his ideals and of his conduct resulting therefrom. To say this is not to disparage knowledge, for feeling and volitional attitudes cannot exist in its absence. The more extensive and better organized the knowledge of the individual is, the greater is the probability, other things being equal, that he will possess worthy ideals and tendencies to choose and do the right things. Fortunately, under the direction of the wise and skilful teacher, the child's emotional and volitional development is likely to go forward concurrently with his intellectual development. Ideas of conduct become ideals when coloured with emotional qualities; ideals determine what he chooses to do in moral situations; and his habits of choice determine his character.

A word of caution is perhaps advisable before this discussion is closed. The moral education of the child is accompanied by certain dangers. One of the most serious is that, in our desire to influence him morally, we may arouse reaction and antagonism against the type of conduct we desire him to adopt. Particularly does he react against direct moralizing. He dislikes preaching, and especially that form of instruction which tags a moral precept to the literature he reads. It is not meant that he should not read stories with an underlying moral truth, for most good stories illustrate some fundamental principle of conduct. However, when this is fairly obvious, the teacher should not attempt to drive it home too strongly, or to make too pointed an application to the pupil's life. It may safely be left for him to appropriate on his own account; he has usually sufficient penetration to catch the moral truth that is conveyed. In

other words, he is susceptible to the influence of indirect suggestion. Where direct suggestion in the guise of formal moral instruction arouses only reaction and antagonism, indirect suggestion will be accepted, particularly if it comes from one whom he respects and admires. The idea of worthy action is implanted in the child's mind through the medium of a story or an incident in real life. The idea lies dormant until an occasion for action in a similar situation arises. Then it recurs, but the child regards it as coming from his own inner consciousness, and not from an outside source. In other words, indirect suggestion has become auto-suggestion. This is only another way of saying that moral action is the product of the reconstruction of experience, a principle that applies in the emotional and volitional spheres equally with the purely intellectual sphere.

To summarize this discussion, it may be said that the school as a formal agency for the education of the child offers through the medium of its various activities, and particularly by means of proper instruction, unlimited opportunity for the inculcation of ideals. The school offers, too, considerable opportunity for the exercise of choice in alternative courses of action. But it is in the larger field of the practical affairs of life that choice must chiefly be exercised. For this contingency, the school can best prepare the pupil by fortifying him with true ideals of life and conduct, which are so keenly realized that they will function in his later life in habits of right choice, and, consequently, in worthy behaviour.

CHAPTER XXVIII

QUESTIONING

AFTER his first day in school, a boy six years of age was asked by his anxious parents how he had enjoyed it. "All right", said the boy, "but the teacher didn't seem to know much; she was asking questions all the time." Whether this teacher was teaching well or badly depends to a considerable extent upon the character of the questions and the response of the class thereto. In any event, this small boy showed some appreciation of one of the most serious weaknesses of teachers, namely, the tendency to question too much.

In an effort in practice teaching, a student in the training school asked a class 285 questions in the course of thirty minutes. So nervous was she that she did not wait for answers to a great number of them; she asked questions from sheer inability to endure silence. In another case three observers were provided with stop-watches and asked to find, (1) the time during which the teacher was speaking; (2) the time during which the pupils were speaking; and (3) the time during which there was silence. The teacher was mainly occupied in asking questions, the pupils in answering them. When the various results were totalled and turned into percentages, the teacher was much astonished to find that she had taken up 86 per cent. of the time, the pupils 5 per cent., while silence accounted for the remaining 9 per cent. Though these examples are admittedly unusual, they suggest that questioning is worthy of careful study.

Notwithstanding the possibility of overworking it, questioning is universally regarded as one of the most important of teaching devices. While it may not always be true that good questioning is synonymous with good teaching, there can be no doubt that the teacher must have, as one of his qualifications, the ability to question well. A good question is a situation to meet, a problem to solve. A stimulating problem arouses and directs the reconstructing activity. The process of reconstruction, as has been indicated in previous chapters, is the prime requisite of all learning and the end which all effective teaching endeavours to realize. Questioning is one of the best means of securing this reconstructing activity which determines intellectual progress. The teacher who wishes to master the technique of his art must, therefore, attain skill in questioning.

FAULTS IN QUESTIONING

There are three serious weaknesses that many teachers exhibit, namely, questioning when they ought to tell, telling when they ought to question, and questioning the pupils when the pupils should do the questioning. To tell pupils what they might easily discover for themselves is to deprive them of the satisfaction of conquest. On the other hand, to question upon matter which the pupils cannot reasonably be expected to know or discover is to discourage effort and encourage guessing. Still further, to do all the questioning, and never to give opportunity to the pupils to make inquiries, may suppress and destroy the natural curiosity and spirit of investigation that all children ought to have. In an ideal order of things, learning situations would be presented in such a way that the pupils would do most of the questioning. The school has to some extent reversed the order of nature in

this regard. To know just when to question, when to tell, and when to encourage the pupils to question, requires considerable discrimination and insight on the part of the teacher.

PURPOSES OF QUESTIONING

The main purposes of questioning pupils have been implied in our discussions of the various ways in which the pupil acquires knowledge. In our examination of the illustrative lessons outlined in Chapter XVIII, we have noted that the pupils are led to meet situations by such reconstruction of their former experiences as will solve the problems presented. This suggests one of the principal purposes of questioning—to assist pupils to reorganize their old ideas for the adequate interpretation of new experiences. The pupil is confronted by a situation, and the teacher assists him by questioning to recall relevant old ideas and to set up relations among these in such a way that the difficulty will be solved. The questions simply direct the pupil's thought along a definite channel to a specific end. The pupil, aroused to activity by the teacher's questions, sets up new relationships, makes new discoveries, forms inferences, formulates laws. The teacher's responsibility lies in the logical arrangement of the questions, so that the pupil misses none of the connecting links in his new organization of knowledge.

A second purpose of questioning, not altogether unlike the first, is to test whether the pupil's organization of his old ideas is an adequate means of meeting the situation. In connection with the various forms of lesson assignment discussed in Chapters XIV to XVII inclusive, questioning by the teacher is frequently essential to determine whether the pupil has satisfactorily completed

the assignment. The teacher must question to assure himself that the pupil has actually organized his ideas into a solution of the problems presented. The pupil is called upon to reproduce what he has learned, either in connected summary or in reply to questions designed to test his understanding of the matter learned. The same precaution must be taken, also, at various stages and at the end of the oral teaching lesson. At convenient intervals during the presentation of the material and at the close, the pupil should be given an opportunity to summarize, in a connected way or in answer to fairly comprehensive questions, the main facts of the lesson. Thus the teacher discovers how successful has been the pupil's reconstruction of his experiences. The pupil on his part, as the result of such reproduction, has the organization of the facts more clearly fixed in his mind. The answers should be of considerable length, logically connected, and expressed in good language. The reader will note the parallel between this purpose of questioning and the expression or application phase of the reconstruction process.

The two purposes of questioning above described might be summarized as, (1) leading to reconstruction of experience, and (2) testing the reconstruction when completed.

CHARACTERISTICS OF GOOD QUESTIONS

Good questions should seize upon the important features of the subject-matter and emphasize these. Unimportant details, though useful in giving vividness to a narrative, enabling the pupil to build up a clear picture of the scene or incident, may well be ignored in questioning. The teacher must see that the pupil grasps the

essentials, and must direct his questions towards the attainment of that end.

The questions should be arranged in logical sequence, so that the answers, if written out in the order given, would form a connected account of the topic under discussion. The testimony of a witness in court, as reported by the newspapers, reads like a continuous story. The witness did not give his testimony in this form, but his answers to the lawyer's questions formed a continuous account. The lawyer took care to ask the questions in a logical order.

Further, the questions should require the expression of a judgment on the part of the pupil. In the main they should not be answerable by a single word or a brief phrase. One of the greatest weaknesses in the answers of pupils is the tendency to extreme brevity. As a result, it is difficult to get pupils to give a connected and continuous narration, description, or exposition, in any subject. The remedy for this defect is to ask questions which demand answers of considerable length, and to avoid those which require only a fragmentary answer.

FORM OF THE QUESTION

It should be borne in mind that the teacher's language influences the language habits of his pupils. Carelessly-worded, poorly-constructed questions are likely to result in answers having similar characteristics. On the other hand, correctness in the form of the question asked, accuracy in the use of words, simplicity and directness of language, will be reflected in the form of the pupil's answers. Care must, therefore, be exercised as to the form in which questions are asked.

Questions should be stripped of all superfluous introductory words, such as, "Who can tell?" "How many of

you know?" "I wonder how many little boys and girls in this class can show me," etc. Such prefaces are not only useless and wasteful of time, but they also put before pupils a bad model so far as directness and conciseness in speech are concerned.

The questions should be so clear and definite in meaning as to admit of only one interpretation. Questions such as, "What happened after this?" "What did Cromwell become?" "What about the rivers of Germany?" "What might we say of this word?" are objectionable on the score of indefiniteness. Many correct answers might be given for each, and the pupils can only guess at what is required. If the question cannot be so stated as to make what is desired unmistakable, the information had better be given outright.

Questions should be brief and usually deal with only one point, except perhaps in asking for summaries of what has been covered. In the latter case, it is frequently desirable to put a question involving several points, in order to ensure definiteness, conciseness, and connectedness in the answer; for example, "For what is Sir Alexander Mackenzie noted? State his great aim and describe his two most important undertakings". But in dealing with matter taken up for the first time or involving original thought, this type of question, demanding as it does attention to several points, would put too great a demand upon the powers of young children. Under such conditions, it is best to ask questions requiring only one point in answer.

FORM OF ANSWERS

Reference has already been made to the possibility of improving the pupil's language power through his answers. To secure the best results in this regard, the

teacher should insist on answers that are grammatically correct and usually in complete sentences. It would be pedantic, however, to insist always upon the latter condition. For such questions as, "What British officer was killed at Queenston Heights?" or, "What province lies west of Manitoba?" the natural answers are, "General Brock," or, "Saskatchewan." To require pupils to say, "The British officer killed at Queenston Heights was General Brock", or, "The province west of Manitoba is Saskatchewan", would be to make the recitation unnatural and formal. When answers are a mere echo of the question with some slight inversion or addition, they become exceedingly mechanical, and useless from the point of view of language training.

While it is desirable to avoid, as far as possible, questions that admit of answers of a single word or short phrase, such questions are sometimes necessary and are not objectionable.

Questions should not be thrown into the form of an elliptical statement in which the pupil merely fills a blank, for example, "The capital of Ontario is?" "The first English parliament was called by?"

Nor should they be given an inverted form, as "Montreal is situated where?" "The Great Charter was signed by what king?"

Alternative questions, such as, "Is this a noun or an adjective?" "Was Charles I willing or unwilling to sign the Petition of Right?", as well as those questions that are answerable by "Yes" or "No", require little thought to answer and should be avoided if possible. When they are used, the pupil should at once be required to give reasons for his answer.

Neither the form of the question nor the teacher's tone of voice or manner should afford any inkling as to the answer expected.

CALLING FOR ANSWERS

In order that the attention of the whole class may be maintained, the question should be proposed before the pupil who is to answer is indicated. If the teacher says, "John, of what use are roots to the plant?" it is probable that John may be the only attentive member of the class.

No fixed order in calling upon the pupils should be adopted. If the pupils are never certain beforehand who is to be named to answer the question, they are more likely to be kept constantly on the alert.

The questions should be carefully distributed among the class, the duller pupils being given rather more and easier questions than the brighter pupils. One of the temptations that the teacher has to overcome is that of giving the clever and willing pupils the majority of the questions.

The question should seldom be repeated unless the first wording is so unfortunate that the meaning is not clear. To repeat questions habitually is to put a premium on inattention on the part of the pupils. A bad habit often noted among teachers is that of wording the question in several ways before anyone is asked to answer it.

METHODS OF DEALING WITH ANSWERS

As has been already indicated in another connection, the answers of the pupils should be generally in complete sentences, and frequently should be in the form of a continuous paragraph or series of paragraphs, especially in summaries and reviews. The continuous answer

should be cultivated much more than it is, as a means of training pupils to organize their information and to express themselves in clear and connected discourse. On the other hand, however, children should be discouraged from giving more information than is demanded by the question.

While it is desirable that the correctness of an answer should be indicated in some way, the teacher should guard against forming the habit of indicating every correct answer by a stereotyped word or phrase, such as, "Yes", or, "That's right".

Answers should seldom be repeated by the teacher, unless it is desirable to recast them for purposes of emphasis. Repetition of answers encourages careless articulation on the part of the pupil answering, and inattention on the part of the others.

The answers given by the pupils should almost invariably be individual, not collective. The practice of allowing all the pupils to answer together is one of the most pernicious of all classroom devices. Simultaneous answering makes a noisy classroom, cultivates a monotonous and measured method of speaking, and encourages the habit of relying on others. There are always a few leaders in the class who are willing to take the initiative in answering, and the others merely chime in with them. The method is not suitable for the expression of individual opinion, for all pupils must answer alike. There is, further, the possibility that absurd blunders may pass uncorrected, because in the general repetition the teacher cannot detect them.

GOOD AND BAD QUESTIONING

In the light of the discussion up to this point, the student will be able to estimate the character of the

following questions selected at random from those used by teachers-in-training:

1. Is Toronto on Lake Ontario? (To the pupils in a Toronto school)

2. What do you notice about these two lines? (The lines were parallel.)

3. Why do we multiply the length by the width? (After the rule for finding the area of a rectangle had been discovered.)

4. What is a lea? (The lowing herd winds slowly o'er the lea.)

5. The capital of Canada is.....?

6. Did you hear anything? (After the teacher had exploded a mixture of hydrogen and oxygen.)

7. Where was Tennyson born? (The first question asked in a lesson on *The Revenge*.)

8. What shall I do? (Teacher, waving a magnet, began a lesson on the magnet by scattering a number of iron tacks on the floor and telling the children that he could not see them.)

9. George, what are three times twenty-four?

10. Tell me all that you have learned. (After a discussion on "Puritans")

11. What is necessary for the growth of plants?

12. Why is Newfoundland colder than the British Isles, although, on the whole, it is more southerly?

Most of the above questions are faulty. The first can be answered only by 'yes', or 'no', and by no stretch of imagination can it be said to arouse much intellectual activity in any pupil. The question in the form, "Where is Toronto situated?" might possibly be a testing question for some pupils, but hardly for those living in Toronto.

The second question lacks definiteness. The pupils actually noticed that one line was longer than the other, that both were straight, that one was thicker than the other, etc. At last the teacher in desperation said, "Can't you see that they are parallel?" If he had asked them what they noticed about the direction of the two lines he would have achieved his object immediately.

In the third question, what the teacher actually expected was a repetition of the various steps which led up to the method of finding areas. If he had asked for a recapitulation of the steps of the argument, he would have got what he wanted.

The fourth question, "What is a lea?" should not have been asked unless the teacher was sure the pupils had met the word in their previous study of poetry. It is a purely poetical term, which most pupils would be unlikely to know. The proper procedure under ordinary conditions would be to tell the children that a lea is a tract of open ground generally covered with grass. Their knowledge of pastures would enable them to grasp the meaning without any difficulty. As a matter of fact, teachers ask questions when they should tell, almost as frequently as they tell when they should ask questions.

"The capital of Canada is" is an elliptical question. It is a poor form, since it requires a minimum of thought in answering it.

Question six is useless, since it provokes no mental effort at all.

"Where was Tennyson born?" deals with the life of the poet. The subject of study was *The Revenge*, not the life of Tennyson. Young teachers are prone to think that they are teaching literature when in reality they are relating biographical facts about a poet.

The actual answer given to, "What shall I do?" was, "Please, sir, get a telescope". It was a surprising and somewhat rude answer, but the question deserved little better fate. The teacher was not sufficiently explicit with his opening question.

"George, what are three times twenty-four?" is a question that sets George alone thinking; the rest of the pupils sit back in apathy, thinking that there is nothing for them to do. If the teacher had asked the question, waited a short time, and then called on George, all the pupils would have tried to work the problem.

"Tell me all that you have learned", is too large a problem, too vague, and indefinite. In the final review, the steps of the lesson could have been retraced and summarized by a set of skilful questions.

"What is necessary for the growth of plants?" is a good question. It challenges the attention and thought of the pupils, and gives each one a chance to make a contribution. It is really much better than such a series as the following, each of which suggests the answer: "Will plants grow where the sun cannot shine on them?" "Do plants need rich soil?" "Will they grow without water?" "What happens to a plant when it freezes?" "What happens when it is too hot?" and so forth.

The twelfth question is also good. Newfoundland is nearer the equator than the British Isles, yet the British Isles are warmer. Why is this? Finding the reasons and verifying them by references to the actual geographical facts supplied enough motivated material for a whole teaching period.

ACQUIRING SKILL IN QUESTIONING

Since questioning is an important teaching device, skill in the art should be acquired early. Mere practice

is not enough, for veteran teachers are sometimes weak in questioning. A bad habit is just as easily acquired as a good one. The practice must be of the right kind, guided by established principles, if it is to be effective. Good habits in questioning are to be acquired in the same way as in any other art. The teacher must study the subject, watch his questions closely, criticise his efforts, and keep continuously trying to improve his technique.

There are some devices which may be recommended for the beginner before the bad habits have become ingrained. Get a stenographer, or failing a stenographer, some other student teacher who can write quickly, to take down as many of the questions and answers as occur in a given period. Study these carefully in the light of the principles enumerated above, note the major faults, and try to eliminate them at subsequent trials. Another good plan is to get a stop-watch record of the time allowed the pupils for answers to thought questions. If the average falls below five seconds, deliberate attempts to increase the interval should be made. Thirdly, records of the relative times that the teacher and pupils occupy in speaking during a discussion are valuable. If the teacher can reduce the ratio from 9 to 1 to 6 to 4, he is on the high-road to success. For this means that he has trained himself to frame questions which call for clear and connected discourse from the pupil—an invaluable exercise for both.

LIMITATIONS OF QUESTIONING

We should not leave the discussion of questioning without emphasizing once more certain important considerations connected with the subject. Though questioning is one of the most valuable of teaching devices,

it is quite susceptible of being overworked, as has already been pointed out. There is quite as much danger of using it too extensively as there is of using it too little. Frequently, teachers try to "draw" from pupils what, because of their limited past experience, they could not be expected to know. It is possible by too much questioning to cover up the essential facts of the lesson rather than reveal them, and to mystify the pupils rather than clarify their ideas. Further, it is possible to monopolize the questioning privilege to the extent of destroying the spirit of inquiry which all learning situations should develop in children. These are the main abuses of the device. After all, it should be remembered that, important as good questioning undoubtedly is, it is not the only thing in teaching technique. In teaching, as elsewhere, variety in procedure is a source of interest. Sympathy, sincerity, enthusiasm in the teacher, will do more to secure mental activity in the pupils than mere excellence in questioning. The energetic, enthusiastic, sympathetic teacher, who is able to create learning situations which the pupil is eager to meet, may secure better results than the teacher whose technique in questioning is well-nigh perfect, but who lacks these other qualifications. If, however, to these qualifications he adds a high degree of efficiency in questioning, his success in teaching is so much the more assured.

CHAPTER XXIX

WRITTEN EXAMINATIONS

IT HAS frequently been pointed out in this Manual that good teaching demands that the pupil's knowledge of the facts taught in school should be tested at every turn. In Chapter XXIV, it was noted that some form of outward expression or application is required to determine the clearness of, and to give permanence to, the pupil's impression. In the chapter immediately preceding this, it was noted that oral questioning is one of the means by which to secure expression on the part of the pupil, and to test the clearness of his grasp of knowledge obtained through school activities. Oral questioning, however, has one serious weakness as a test of knowledge, especially in large classes. At best it can adequately test only a few pupils, and there is always danger that the teacher may be deceived as to the attainments of the class as a whole. A more reliable test of a large group of pupils can be secured through the medium of the written examination.

The written examination has three main functions—(1) motivation of the pupil, (2) training in written composition, and (3) measurement of achievement. These purposes are so obvious that they need little comment. As an incentive to effort, the written examination is effective with most children. The desire to obtain high marks and to stand well in the class is a strong inducement to pay attention to school work and to keep the facts of a subject well organized in the mind. As a training in composition, the written examination affords excellent results in rapid organization of ideas and in

clearness and conciseness of statement. As a measurement of achievement, it reveals to the pupil his weakness and deficiencies in knowledge and skill, and indicates the points where improvement is necessary. At the same time, the results are valuable to the teacher in showing him wherein his teaching has been a success or a failure. The response of the pupils will indicate the points where it will be advisable to give further instruction.

OBJECTIONS TO WRITTEN EXAMINATIONS

The written examination as a testing device has been strongly attacked by critics. It is contended that it imposes an undue nervous strain upon the pupil, a contention that has some weight when examinations are too frequent or too long. It is pointed out that its results are unreliable, since it gives undue advantage to the pupil who is expert in rapid expression, but who may know less about the subject than other pupils not thus gifted. It is further maintained that the written examination encourages "cramming", that is, the rapid covering of a large field, in the hope that some of the imperfectly assimilated knowledge may stay in the mind long enough to be transmitted to the examination paper. But the most serious criticism of the written examination is that it fails to test the most important of all the pupil's attainments, his moral qualities. No written test can measure, except in a superficial way, his honesty, his truthfulness, or his perseverance, nor can it determine his appreciation of the good and beautiful in character, art, or literature.

Notwithstanding the validity of these objections to written examinations as they are sometimes conducted,

there can be no doubt that they have a useful and important place as a testing device in the schools. As a matter of fact, most of the foregoing criticisms lose much of their force if the examinations are properly carried out. If they are short and frequent, occurring without advance notice and as a matter of course in the day's routine, they are relieved of most, if not all, the objections urged against them.

The final written examination as an instrument for determining promotion to a higher class has been much less frequently used in recent years in Ontario than it was formerly. As conducted by outside authority, it has been practically banished from the elementary school, the pupils being promoted from grade to grade on their term work. In urban centres the majority of the pupils are given High School Entrance standing on the recommendation of the principal, without examination. Under certain conditions, secondary school students are granted Lower School standing also without final examination. In fact, an Ontario student may proceed all the way from the Kindergarten to the Middle School of the High School without once being required to pass a final promotion examination. Departmental examinations are still required, however, for admission to the Provincial Normal Schools and the University. It has seemed desirable up to the present to maintain a uniform test for admission to, and graduation from, the professional schools. These measures of relief from the pressure of final examinations have, on the whole, been attended with beneficial results.

But this extensive relinquishment of the written examination as a final test does not mean that it has been altogether abandoned. In fact, it is probable that it is used to a larger extent than ever as a regular

test of the pupil's progress throughout the school year. The pupil's term work, upon which his promotion depends, is measured, in part at least, by written examinations conducted from time to time as part of the ordinary school routine. The written examination is by no means doomed to extinction, but, on the contrary, is likely to take on new importance as time goes on.

TYPES OF WRITTEN EXAMINATIONS

There are three main types of written examination at present in common use—(1) the essay type, (2) the standardized test or scale, (3) the "new" or objective examination.

1. The Essay Type

The essay type of examination is given in those subjects whose main purpose is to impart information; for example, history, geography, literature, science, etc. The pupil is required to answer most of the questions in continuous paragraphs; he must compare, explain, discuss, define, and give reasons. This affords a valuable exercise in logical thinking and in lucid expression, and therefore performs an important function in the pupil's development.

The answer papers in the essay type of examination are difficult to evaluate with absolute fairness. For instance, in the case of a paper in which the handwriting, spelling, and language are bad, the examiner's judgment is likely to be more or less biassed against the candidate, though from the standpoint of facts the answers may be good. On the other hand, the paper that is neatly written, correctly spelled, and gracefully phrased is likely to be valued too highly by the examiner. Moreover, the standards of judgment of different examiners, and even of the same examiner at different periods,

vary greatly. Experiments have frequently shown that the same answer paper read by several examiners will have widely different valuations. In the Departmental examinations in Ontario, this variability is reduced to a minimum by, (1) dividing the questions into parts, each requiring a direct and concrete answer, (2) reaching an agreement among examiners as to what shall constitute a correct answer, (3) grading the marks in accordance with the difficulty or importance of the question, (4) limiting the number of marks deducted for misspelled words or incorrect language. In this way it is attempted to eliminate as far as possible the influence of handwriting, neatness of arrangement, and form of expression, upon the judgment of the examiner with regard to the valuation of an answer.

A second difficulty in the essay type of examination is that it provides only a limited "sampling" of the pupil's knowledge, that is, it tests only a small part of the field covered in the subject. The fact that a pupil makes 75 per cent. on an examination paper does not mean that he knows 75 per cent. of the subject, for the question paper may not have tested more than 25 per cent. or even 5 per cent. of the field. Hence arises the unreliability of the test. It is quite possible that the well-prepared candidate may fail, because the examiner has happened to ask for some of the few things that he does not know, while, on the contrary, the weak candidate may be passed, because the examiner has happened to ask for some of the few things he knows.

Notwithstanding these defects of the essay type of examination, its marked advantages from the standpoint of the practice it gives in the organization of knowledge and connected expression are sufficient to warrant its retention as a testing device.

2. *The Standardized Test*

A considerable amount of work has been done by educators in recent years in standardizing tests for the measurement of the intelligence, skill, and achievement of children. Tests have been devised that are presumed to be within the abilities of average children of particular ages or in particular grades. A technique for conducting and scoring the test has been developed, and it is claimed that a fairly accurate measurement of the pupil's intelligence and attainments can be secured. The subjects that lend themselves particularly to standardized tests are the fundamentals—reading, spelling, and arithmetic. Scales have been established to assist in the measurement of the pupil's skill in writing and composition. These standardized tests and scales are useful to teachers as an indication of what pupils of a given age or grade should be able to do, and as a means of classifying pupils or determining their promotion. The literature of the standard test in the measurement of intelligence and achievement is very large, and the student should become familiar with some of the better known tests whose usefulness and reliability are acknowledged.

3. *The "New" Examination*

An examination which is similar in type to the standardized test, but which is not standardized either as to grade or valuation, is called by its advocates, for want of a better name, the "New" examination. It consists of a large number of questions covering completely the whole field examined upon, each answerable by underlining a word, by attaching a number, or by writing "Yes", "No", or some other single word. As a matter of fact, it is "new" only in the classification and standardization of the forms into which it is thrown.

From time immemorial, teachers have frequently tested their classes in such information subjects as history and geography by dictating a series of questions, after each of which the pupils were given time to write a brief answer, usually a single word or a short phrase. The questions were so constructed that only one answer would be correct, and the pupils could easily score their own or one another's papers. Recently educators have devoted much time and attention to the reduction of this time-honoured device to a number of model forms. The following examples will be sufficient to illustrate the typical forms that have been devised:

(a) *True-False Test*

This consists of a number of statements, some of which are correct and others incorrect, after each of which the words "true", "false", are printed. The pupils are instructed to underline the word "true", if the statement is correct, and to underline "false", if incorrect. Thus a test on the geography of Ontario might be constructed along the following lines:

- | | | |
|--|------|-------|
| 1. Ontario is the largest of the
Provinces. | True | False |
| 2. Ontario extends farther south
than any other Province. | True | False |
| 3. Ontario has a larger population
than Quebec. | True | False |
| 4. Toronto is farther north than
London, England. | True | False |
| 5. Northern Ontario has large coal
deposits. | True | False |
| 6. The chief industry of southern
Ontario is agriculture. | True | False |
| 7. Salt is produced in Essex County. | True | False |

- | | | |
|---|------|-------|
| 8. Petroleum is found in Huron County. | True | False |
| 9. Sudbury is the centre of a gold-producing district. | True | False |
| 10. The Welland Canal connects Lake Erie with Lake Ontario. | True | False |
| 11. The Nipigon River flows into Lake Nipigon. | True | False |
| 12. The St. Clair Tunnel connects Windsor with Detroit. | True | False |
| 13. Sault Ste. Marie manufactures steel rails. | True | False |
| 14. St. Catharines is situated on the Niagara River. | True | False |
| 15. Ontario leads the world in the production of nickel. | True | False |

Occasionally the pupils may be required to indicate the truth or falsity of the statements by writing "T" for "true", "F" for "false", or by writing "Yes" or "No". Sometimes questions answerable by "Yes" or "No" may be substituted for the statements, for instance, "Is Ontario the largest of the Provinces?"

The usual method of scoring the True-False test is to subtract the number of wrong answers from the number of right answers ($R - W$). This plan takes into account the fact that, ordinarily, the pupil could be expected to guess half the answers correctly without knowing anything about the subject, in which case his score obviously should be zero.

(b) *Multiple Choice Test*

In this type of test, the pupil is required to select the correct answer from among several that are suggested.

For example, a test on the history of the Stewart period might be arranged upon some such plan as the following:

Place in the brackets at the end of each statement the number of the correct answer:

1. The Petition of Right was signed by, (1) James I, (2) Charles I, (3) Charles II....()
2. Payment of Ship Money was refused by, (1) Sir John Eliot, (2) John Pym, (3) John Hampden.....()
3. The Long Parliament impeached, (1) Earl of Strafford, (2) Duke of Buckingham, (3) Earl of Essex.....()
4. William Laud was, (1) a general, (2) a colonizer, (3) an archbishop.....()
5. *Paradise Lost* was written by, (1) Spenser, (2) Milton, (3) Shakespeare.....()
6. The Declaration of Rights was signed by, (1) Oliver Cromwell, (2) Charles II, (3) William III.....()
7. The Duke of Marlborough won the battle of, (1) Blenheim, (2) Boyne, (3) Naseby....()
8. The Hudson's Bay Company was founded by, (1) Henry Hudson, (2) Prince Rupert, (3) Sir Walter Raleigh.....()
9. John Bunyan wrote, (1) *The Merchant of Venice*, (2) *The Faerie Queen*, (3) *Pilgrim's Progress*.....()
10. The Act of Settlement, (1) closed the Civil War, (2) determined the succession to the throne after Anne, (3) settled the Revolution of 1688.....()

The usual formula for scoring the multiple choice tests is $R - \frac{W}{N-1}$, where R = right answers, W = wrong answers, and N = number of choices in each statement.

(c) *Completion Test*

In this type the pupil is required to complete a statement by writing a suitable word in a blank space. For instance, after a study of the geography of British Columbia, a test such as the following might be submitted:

British Columbia lies immediately west of the Province of..... It is separated from the United States by the..... parallel of latitude. The..... Ocean forms most of the western boundary. Part of..... also runs some distance along the western side. The..... mountains are the highest range. The..... is the longest river. The most valuable product of the province is..... The principal fish caught is the..... Fruit is produced in large quantities in the..... Valley. Coal is mined at..... on Vancouver Island. is the capital. The largest city is..... Prince Rupert is the northern terminus of the..... Railway.

The score for this type of test should be the number of correct answers.

(d) *Matching or Association Test*

Two examples of this type of test are given—

i. In the first column are several outstanding events in Canadian history; in the second are the names of men associated with these events. From the second column,

select the names of two men associated with each event, and write their numbers in the brackets.

- | | |
|-----------------------------|---------------------------|
| 1. The Conquest (1760) | 1. Sir Guy Carleton |
| () () | 2. Colonel De Salaberry |
| 2. Coming of the United | 3. General James Wolfe |
| Empire Loyalists | 4. Lord Sydenham |
| () () | 5. Robert Baldwin |
| 3. Exploration of the West | 6. David Thompson |
| () () | 7. Thomas D'Arcy |
| 4. Search for the North- | McGee |
| West Passage | 8. Sir Alexander |
| () () | Mackenzie |
| 5. War of 1812 | 9. William Lyon |
| () () | Mackenzie |
| 6. Rebellion of 1837-38 | 10. Lord Elgin |
| () () | 11. Henry Hudson |
| 7. Act of Union | 12. Marquis de Montcalm |
| () () | 13. Louis-Joseph Papineau |
| 8. Struggle for Responsible | 14. Sir Charles Tupper |
| Government | 15. Colonel James |
| () () | Fitzgibbon |
| 9. Confederation | 16. Colonel John Graves |
| () () | Simcoe |
| | 17. Lord Durham |
| | 18. Sir John Franklin |

ii. The second column of the following contains an example of each of the substances named in the first column. Insert in the brackets in the second column the proper numbers, so that the substance and the example will be correctly paired.

- | | |
|-------------|-------------------|
| 1. Mixture | () Hydrogen |
| 2. Solution | () Zinc sulphate |
| 3. Acid | () Alcohol |

- | | | |
|----------------------|--------|-------------------|
| 4. Base | () | Gunpowder |
| 5. Salt | () | Hydrogen chloride |
| 6. Bleaching agent | () | Lime |
| 7. Reducing agent | () | Sulphur dioxide |
| 8. Solvent | () | Sodium hydroxide |
| 9. Dehydrating agent | () | Brine |

(e) *Arrangement Test*

Two examples of this type of test are given—

i. Arrange the following Canadian cities in the order of relative location from west to east:

Quebec, Toronto, St. John, Winnipeg, Vancouver, Hamilton, Halifax, Ottawa, Calgary, Montreal, Port Arthur, London, Windsor, Sydney, Sault Ste. Marie, Kingston, Regina, Brantford, Sarnia, Peterborough, Three Rivers, Moncton, St. Hyacinthe, Sherbrooke, Brandon.

ii. Arrange the following men in the order in which they lived, beginning with the earliest:

William Pitt the Younger, Stephen Langton, Sir Robert Peel, Alfred the Great, Rt. Hon. W. E. Gladstone, Simon de Montfort, Oliver Cromwell, John Wycliffe, Sir Robert Walpole, William the Conqueror, Thomas à Becket, Cardinal Wolsey, Earl of Oxford (H. H. Asquith), Sir Francis Drake, Duke of Marlborough.

Properly conducted, the so-called “New” examination gives a wider “sampling” of the pupil’s knowledge; that is, it covers a more comprehensive field than the essay type, and, consequently, affords a more accurate indication of what the pupil knows about a subject. It permits greater concentration of thought, for, since the pupil has little writing to do, he can devote himself exclusively to the solution of the problem. Moreover, the pupil’s work may be quickly and accurately scored.

On the other hand, it tests only the pupil's knowledge of individual facts, and gives little indication as to whether these exist in his mind as mere isolated scraps of information or as elements of a well-knit body of knowledge. It gives little or no practice in the organization of ideas in a connected description or exposition, and little or no opportunity of continuous expression. Moreover, in the absence of certainty of knowledge, there is a constant temptation to guess.

The "New" examination may serve a useful function as a testing device in the school, but the day is probably far distant when it will entirely displace the traditional essay type of examination. Its place is that of an auxiliary, not of a substitute.

CHAPTER XXX

CHARACTERISTICS OF CHILDREN

A GRAMMATICAL analysis of the sentence, "The teacher taught the boy arithmetic", reveals the fact that there are two objects of the verb—an indirect object, "boy", and a direct object, "arithmetic". An analysis of the psychological implications of the sentence will suggest that the teacher must have two kinds of knowledge—(1) of the pupil, and (2) of the school curriculum. With the latter type of knowledge this Manual does not deal except indirectly. We have considered the former type of knowledge incidentally, in our analysis of the principles underlying the learning processes of children, and in our analysis of the procedures used in teaching. If the plan therein set forth is to be carried out successfully, it will be necessary for the teacher to have more specific knowledge of the tendencies, interests, and capacities of the children than has been presented in the previous discussions. These characteristics change as the pupil advances in age and experience, and, consequently, the materials and the methods that would be suitable at one stage of his development would be quite unsuitable at another stage. Hence it is desirable that the teacher should understand the varying characteristics of the child at different periods.

Much work has been done by investigators, and many volumes have been written by educationists, in connection with child study. In the brief space at our disposal, it will be impossible to enter upon an elaborate discussion of the subject. The most that can be attempted is to give some of the outstanding characteristics of children

at different stages in their development, and some of the most important educational implications of these characteristics.

A few typical examples will serve to illustrate the importance of a knowledge of child nature to the teacher.

1. When the teacher knows something about the inherited and acquired tendencies of children, he will utilize these tendencies in his teaching and work with, not against, them. He will, wherever possible, make use of the play tendency, as for example, when he makes the multiplication drill a matter of climbing a stairway without stumbling, or crossing a stream on stones without falling in. He will use the tendency to physical activity in having the children learn number combinations by manipulating blocks, or square measure by actually measuring surfaces, or fractions by using scissors and strips of cardboard, or geographical features by modelling in sand and clay. He will use the imitative tendency in cultivating desirable personal habits, such as neatness, cleanliness, and order, and in modifying conduct through the inspiring presentation of history and literature. He will provide exercise for the tendency to curiosity by suggesting interesting problems in geography and nature study.

2. When the teacher understands the principle of eliminating undesirable tendencies by substitution, he will not regard as cardinal sins the pushing, pinching, and kicking in which boys give vent to their excess energy, but will set about directing this purposeless activity into more profitable channels. He will thus substitute another means of expression for the present undesirable means. He will, for instance, give opportunity for physical exercises, paper-folding and cutting, cardboard work, wood-work, drawing, colour work, modelling etc., so far as possible in all school subjects. He will try to transform

the boy who teases and bullies the smaller boys into a guardian and protector. He will try to utilize the boy's tendency to collect useless odds and ends, by turning it into the systematic and purposeful collection of plants, insects, specimens of soils, specimens illustrating phases of manufactures, postage stamps, coins, etc.

3. When the teacher knows that the interests of pupils have much to do with determining their effort, he will endeavour to seize upon these interests when most active. He will thus be saved such mistakes as teaching in December the poem, *An Apple Orchard in the Spring*, or assigning in June a composition on *A Coasting Party*, because he realizes that the interest in these topics is not then alive. Each season, each month of the year, each festival and holiday has its own particular interests, which may be used effectively in the lessons in literature, in composition, in nature study, and in history. A current event may be utilized to teach an important topic in history or civics. For instance, an impending election may be made the occasion of instruction on voting by ballot, or a recently completed aeroplane flight may be made the basis of a lesson in geography.

4. When a teacher appreciates the extent of the capacities of children at various periods of their development, he will not make too heavy demands upon their powers of logical reasoning, by introducing too soon the study of formal grammar or the solution of difficult arithmetical problems. When he knows that the period from eight to twelve is the period during which habits are most easily established, he will stress, during these years, such things as mechanical accuracy in the fundamental rules of arithmetic, the memorization of gems of poetry, and the cultivation of right physical habits. When he knows the influence of motor expression in giving definiteness,

vividness, and permanency to ideas, he will have much work in drawing, modelling, constructive work, dramatization, and oral and written expression.

PERIODS OF DEVELOPMENT

The period covered by child study may roughly be divided into three parts, namely, (1) infancy, extending from birth to three years of age, (2) childhood, from three to twelve, and (3) adolescence, from twelve to eighteen. While children during each of these periods exhibit striking dissimilarities one from another, there are, nevertheless, many characteristics that are fairly universal during each period. First the common characteristics of each period will be considered briefly.

1. *Infancy*

(1) *Physical Characteristics*—

One of the striking features of infancy is the rapidity with which command of the bodily organs is secured. Starting with a few inherited reflexes, the child at three years of age has attained fairly complete control of his sense organs and bodily movements, though he lacks that co-ordination of muscles by which certain delicate effects of hand and voice are produced. The relative growth is greater at this than at any subsequent period. Another prominent characteristic is the tendency to incessant movement. The constant handling, exploring, and analysing of objects enhances the child's natural thirst for knowledge, and he probably obtains a larger stock of ideas during the first three years of his life than during any equal period subsequently.

(2) *Mental Characteristics*—

A conspicuous feature of infancy is the imitative tendency which early manifests itself. Through this

means the child acquires many of his movements, his language power, and the simple games he plays. Sense impressions begin to lose their fleeting character and to become more permanent. As evidence of this, few children remember events farther back than their third year, while many can distinctly recall events of the third and fourth years even after the lapse of a long period of time. The child at this period begins to compare, classify, and generalize in an elementary way, though his ideas are still largely of the concrete variety. His attention is almost entirely non-voluntary, that is, he is interested in objects and activities for themselves alone, and not for the sake of an end. He is as yet unable to conceive remote ends—the prime condition of voluntary attention. His ideas of right and wrong conduct are associated with the approval and disapproval of those about him.

2. *Childhood*

(1) *Physical Characteristics—*

(a) *Early Period*—In the earlier period of childhood, from three to seven years, bodily growth is very rapid. Much of the vital force is thus consumed, and less energy is available for physical activity. The child has also less power of resistance, and is thus susceptible to the diseases of childhood. His movements are lacking in co-ordination. His handling of small objects is awkward; his use of implements at the dinner table is imperfect; he produces very crude results with a pencil in writing or drawing; he cannot easily thread a needle or make regular stitches.

(b) *Later Period*—In the later period, from seven to twelve years, the bodily growth is less rapid, more energy is available for physical activity, and the co-ordination of muscles is greater. The brain has now reached its

maximum size and weight, any further changes being due to the formation of associative pathways among nerve centres. This is, therefore, pre-eminently the habit-forming period. From the physical standpoint this means that those activities that are essentially habitual must have their genesis during the period between seven and twelve if they are to function perfectly in later life. The mastery of a musical instrument must be begun then if technique is ever to be perfect. If a foreign language is to be acquired, it should be begun at this period, or there will always be inaccuracies in pronunciation and articulation. Among school activities, speech and writing are the two most important to be considered in this connection. Clearness of articulation and accuracy of pronunciation in the case of speech, and neatness and legibility in the case of writing, should be secured at this period. The foundation of such physical habits as cleanliness of person, and neatness of dress, and arrangement of personal belongings, should be well and truly laid.

(2) *Mental Characteristics—*

(a) *Early Period*—The tendency to curiosity is very active in the earlier period of childhood, and this, combined with greater language power, leads to incessant questionings on the part of the child. He wants to know what, where, why, and how, in regard to everything that comes under his notice, and fortunate indeed is that child whose parent or teacher is sufficiently long-suffering to give satisfactory answers to his many and varied questions. To ignore the inquiries of the child, or to return impatient or grudging answers, may inhibit the tendency, and lead to lack of interest in the environment. The imitative tendency is also still active, and reveals itself particularly in the child's play, which, in the main, reflects

the activities of those about him. He plays horse, policeman, school, Indian, in imitation of the occupations of others. The imagination is exceedingly active during childhood, fantastic and unregulated in the earlier period, under better control and direction in the later. It reveals itself in the love of hearing, reading, or inventing stories. The imitative play mentioned above is one phase of imaginative activity. The child's ideas of conduct, in this earlier stage of childhood, are derived from the pleasantness or unpleasantness of their consequences. He has as yet little power of subordinating his lower impulses to an ideal end, and hence is not properly a moral being. Good conduct, must, therefore, be secured at first through the exercise of arbitrary authority from without.

(b) *Later Period*—In the later period of childhood, acquired interests begin to be formed and, coincident with this, active attention appears. The child begins to be interested in the product, not merely in the process. This is the period for the introduction of some of the more serious phases of manual training and household science. The boy becomes interested in making things in the wood-working room; the girl becomes interested in sewing and cookery. The making of collections of stamps, coins, picture post-cards, samples of products of various countries, or manufactures at various stages of the process, is an acquired interest, which manifests itself at this stage and may be turned to advantage in geography. Certain tastes in literature, for example, an interest in stories of adventure and travel or tales of heroism, make their appearance at this stage.

The mind at this period is most retentive of sense impressions. This is, consequently, the time to bring the child into immediate contact with his environment

through his senses, in such departments as nature study and field work in geography. Thus is laid the basis of future potentialities of imagery, and through it appreciation of literature.

As this is the habit-forming period, it is the time for memorization of fine passages of prose and poetry, for securing correctness in spelling and forms of language, and for securing rapidity and accuracy in the mechanical phases of arithmetic.

The child's thinking is still of the pictorial rather than of the abstract order, though the powers of generalization and language are considerably extended. He is able to solve simple abstract problems in arithmetic, and may be introduced to the study of formal grammar; but the more reflective phases of history or the principles of science are as yet beyond his powers.

The social interests are not yet strong, and hence co-operation for a common purpose is largely absent. Clubs, societies, or other organizations do not yet appeal to him. His games show a tendency toward individualism; they are based on the principle, "every man for himself". When co-operative games are indulged in, he is usually willing to sacrifice the interests of his team to his own personal glorification.

3. Adolescence

(1) *Physical Characteristics*—

In early adolescence the characteristic physical accompaniments of early childhood are repeated, namely, rapid growth and lack of muscular co-ordination. From twelve to fifteen, girls grow more rapidly than boys, and are actually taller and heavier than boys at corresponding ages. From fifteen onward, however, the boys rapidly outstrip the girls in growth. Lack of muscular

co-ordination is responsible for the awkward movements, ungainly appearance, ungraceful carriage, with their attendant self-consciousness, so characteristic of both boys and girls in early adolescence. Because of his sensitiveness in this regard, the young adolescent should have specially sympathetic and considerate treatment during this trying period.

(2) *Mental Characteristics—*

Ideas are gradually freed from their sensory accompaniments. The child thinks in symbols rather than in sensory images. Consequently, there is greater power of abstraction and reflective thought. This is, therefore, the period for emphasizing those subjects requiring logical reasoning, for example, mathematics, science, and the reflective aspects of grammar, history, and geography.

From association with others or from literature and history, ideals begin to be formed which influence conduct. It is therefore essential at this period that the associates of the adolescent boy or girl should be individuals of the highest type of character; that the literature read should exemplify worthy ideals of conduct; and that history should be presented in such a way as to lead to admiration of the character and achievements of our national heroes. The fundamental thing is to create interests and attitudes of a proper kind.

The conduct of the young adolescent may occasionally be directed by the principle of suggestion, but the suggestive ideas must be introduced by a person who is trusted, admired, or loved, or under circumstances inspiring these feelings; hence the importance to the adolescent of having teachers of strong and inspiring personality. However, if the suggestive idea is to influence action, it must be introduced in such a way as

not to arouse reaction against it. Reaction will be set up if the idea is antagonistic to the present ideas, feelings, or aims, or if it is so persistently thrust upon the child that he begins to suspect that he is being unduly influenced. To avoid reaction, the parent or teacher should introduce ideas indirectly. For instance, while the mind is concentrated upon one set of ideas, an idea that would otherwise be distasteful may be tolerated. It may lie latent for a time, and when it recurs it may be regarded as original, under which condition it is likely to issue in action.

The adolescent stage is the period of greatest emotional development, and care should, therefore, be exercised to present to the child's mind only those ideas with which worthy emotions are associated. The companions with whom he associates, the pursuits which occupy his leisure, the books he reads, the plays he sees, the sermons and addresses he hears, the games he plays, determine the nature of the emotions he experiences; hence the necessity of careful guidance in these matters. The emotional bent, whether good or bad, is determined to a large extent during this period of adolescence.

So far as morality is the subordination of primitive tendencies to higher ideas, the child now becomes a moral being. His conduct is now determined by reason and by ideals, and the lower primitive motives tend to recede into the background. It follows that coercion and arbitrary authority have little place in discipline at this period. Social interests are prominent, evidenced by the tendency to co-operate with others for a common end. The games of the period are mainly of the co-operative variety, and are marked by a willingness to sacrifice personal interests for the sake of the team or side.

INDIVIDUAL DIFFERENCES

While all children have certain common characteristics at each of the three periods of development, it is even more apparent that every child is in many respects different from every other child. He has certain peculiarities that demand particular treatment. It is evident that it would be impossible to enumerate all the individual differences in children. The most that can be done is to classify the most striking differences, and endeavour to place individual children in one or other of these classes.

1. Differences in Thought

One of the obvious classifications of pupils is that of "quick" and "slow". A pupil of the former class learns easily, but often forgets quickly; a pupil of the latter class learns slowly, but usually retains well. A quick pupil is keen and alert; a slow pupil, dull and passive. The former frequently lacks perseverance; the latter is often tenacious and persistent. The former unjustly wins applause for his cleverness, the latter, equally unjustly, wins contempt for his dullness. The teacher must not be unfair to the dull plodder, who in later years may frequently outstrip his brilliant competitor in the race of life.

Some pupils think better in the abstract, others in the concrete. The former will analyse and parse well in grammar, distinguish fine shades of meaning in language, manage numbers skilfully, or work out chemical equations accurately. The latter will be more successful in doing things, for instance, measuring boards, planning and planting a garden plot, making toys, designing clothes, and cooking. The schools of the past have emphasized the ability to think in the abstract, and to a

large extent have ignored the ability to think in the concrete. This is unfair to the one class of thinker. From the ranks of those who think in the abstract have come the great statesmen, poets, and philosophers; from the ranks of those who think in the concrete have come the carpenters, builders, and inventors. It will be admitted that the world owes as great a debt from the practical standpoint to the latter class as to the former. Let the school not despise or ignore the pupil who, though unable to think well in abstract studies, is able to do things with his hands. The great impetus given in recent years to vocational and technical education is an acknowledgment, not only of the practical value of training to do things with the hands, but also of the cultural value of such training.

2. Differences in Action

There are two extreme and contrasting types of will exhibited by children, namely, the impulsive type and the obstructed type. In the former, action occurs without deliberation, immediately upon the appearance of the idea in consciousness. This type is illustrated in the case of the pupil who, as soon as he hears a question, thoughtlessly blurts out an answer without any reflection whatever. We find a similar illustration in the adult, who, immediately upon hearing a pitiful story from a beggar, hands out a dollar without stopping to investigate whether or not the action is well-advised. It is useless to plead in extenuation of such actions that the answer may be correct or the act noble and generous. The probability is equally great that the opposite may be the case. The remedy for impulsive action is patiently and persistently to encourage the pupil to reflect a moment before acting.

In the case of the obstructed type of will, the individual ponders long over a course of action before he is able to bring himself to a decision. Such is the child whom it is hard to persuade to answer even easy questions, because he is unable to decide in just what form to put his answer. On an examination paper he proceeds slowly, not because he does not know the matter, but because he finds it hard to decide just what facts to select and how to express them. The bashful child belongs to this type. He would like to answer questions asked him, to talk freely with others, to act without any feeling of restraint, but is unable to bring himself to do so. The obstinate child is also of this type. He knows what he ought to do, but the opposing motives are strong enough to inhibit action in the right direction. The remedy for the obstructed will is to encourage rapid deliberation and choice and then immediate action, thrusting aside all opposing motives. Show such pupils that, in cases where the motives for and against a certain course of action are of equal strength, it often does not matter which course is selected. One may safely choose either, and thus end the indecision. The "quick" child usually belongs to the impulsive type; the "slow" child to the obstructed type. The former is apt to decide and act hastily and, frequently, unwisely; the latter is more guarded and, on the whole, more sound in his decision and action.

3. Differences in Temperament

Recent writers on psychology have divided human beings on the basis of temperament into two classes, which they have designated *introverts* and *extraverts*. These names are significant of the characteristics of the individuals to whom the names apply. The introvert is "turned inwards", that is, he is inclined to be introspective, to be more interested in his own intellectual

and emotional states than in outward things, to be retiring and uncommunicative, at times to be moody and even suspicious of the motives of others. The extravert is "turned outward", that is, he is inclined to be interested in outward things and events rather than in his subjective states, to engage enthusiastically in group activities, to be impressionable, cheerful, and optimistic. The two types are easily distinguishable in the classroom. The extravert usually gives little trouble in management; he accepts guidance and direction gracefully and willingly. The introvert needs to be treated with understanding and sympathy; otherwise his natural reserve may be so intensified as to become a serious barrier to any kind of co-operation with others.

Occasionally, in certain children, some of the characteristics of these two types of temperament become accentuated to such a degree as to make the problem of direction rather difficult. For instance, there is a type of extravert represented by the child who thinks himself, his attainments, and his possessions, superior to all others. He believes that his work is perfectly done; he boasts that he is sure he made a hundred per cent. on his examinations; what he has is always, in his own estimation, better than that of others. When the teacher suggests that his work must be better done, he appears surprised and aggrieved. Such a child should be shown that he is right in not being discouraged over his own efforts, but wrong in thinking that his work does not admit of improvement.

Similarly, there is a type of introvert represented by the child who continually imagines that the teacher treats him unjustly, that the other pupils slight or injure him, that, in short, he is an object of persecution. Such a pupil should be shown that nobody has a grudge against

him, that the so-called slights are imaginary, and that he should take a sane view of these things, depending more upon judgment than upon feeling to estimate the action of others toward him.

4. *Differences in the Mentality of Boys and Girls*

Boys differ from girls in the predominance of certain tendencies, interests, and mental powers. In boys the fighting tendency, and capacities of leadership, initiative, and mastery, are predominant. In girls the tendencies to nurse and fondle, and the capacities to comfort and relieve, are prominent. These are revealed in the games on the playground.

The interests of the two sexes are different, since their games and later pursuits are different. In a system of co-education it is impossible to take full cognizance of this fact in the work of the school. Yet it is possible to make some differentiation between the work assigned to boys and that assigned to girls. For instance, arithmetical problems given to boys might deal with activities interesting to boys, and those given to girls might deal with activities interesting to girls. In composition, the differentiation will be easier. Such a topic as *A Ninth Inning Rally* would be more suitable for boys, and on the other hand, *Shopping with Mother* would make a stronger appeal to girls. Similarly, in literature, such a poem as *How They Brought the Good News from Ghent to Aix* would be particularly interesting to boys, while *Maggie Tulliver's Visit to the Gipsies* would be of greater interest to the girls.

As to mental capacities, boys are usually superior in those fields where logical reasoning is demanded, while girls usually surpass boys in those fields involving perceptive powers and verbal memory. For instance, boys

usually, but not always, succeed better in mathematics, science, and the reflective phases of history; girls usually, but not always, succeed better in spelling, in harmonizing colours in art work, in distinguishing fine shades of meaning in language, and in memorizing poetry. The average intellectual ability of each sex is nearly the same, but boys deviate from the average more than girls. Thus, while the most brilliant pupils are likely to be boys, the dumbest are also likely to be boys. It is a scientific fact that there are more individuals of conspicuously clever mind, but also more of weak intellect, among men than there are among women.

A CAUTION

While it has been stated that the teacher should take notice of individual differences in his pupils, it may be advisable, also, to warn the student-teacher against any extravagant tendency in the direction of such study. A teacher is occasionally met who seems to act on the assumption that his chief function is not to educate, but to study children. Too much of his time may, therefore, be spent in the conducting of experiments and the making of observations to that end. While the data thus secured may be of some value, it must not be forgotten that control of the subject-matter of education and of the method of presenting that subject-matter to the normal child, together with an earnest, enthusiastic, and sympathetic manner, are the prime qualifications of the teacher as an instructor.

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